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TITLE:
5th Annual world Congress of IBMISPS on Brain Mapping & Image Guided Therapy

PRINCIPAL INVESTIGATOR:
Babak Kateb

CONTRACTING ORGANIZATION:
International Brain Mapping & Intraoperative Surgical Planning Society (IBMISPS)
8West Hollywood, CA 90046

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PREPARED FOR:
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Please note that there will be an Special issue of IBMISPS-NeuroImage published by Elsevier publishing Company and distributed by March,30 2009. Please visit NeuroImage website…

14. ABSTRACT:

The third annual meeting of International Brain Mapping & Intra-operative Surgical Planning Society (IBMISPS) was held In UCLA-CNSI: www.IBMISPS.Org. IBMISPS is a non-profit society organized for the purpose of encouraging basic and clinical scientists who are interested in areas of Brain Mapping and Intra-operative Surgical planning to improve the diagnosis, treatment and rehabilitation of patients afflicted with neurological disorders. Currently, there is no combined conference on both subjects. This meeting intends to build a bridge between the two fields. The meeting has been organized by the board of directors and who will form the organizing committees: Search, Medical Education Committee, Program and Finance in collaboration with the local organizing committee who are listed on the program. The event did have significant clinical and basic science components. Thus, it was a multidisciplinary venue to explore and clarify a defined subject, problem, or area of knowledge related to BM and ISP with leaders in the field.

The 6th annual meeting of IBMISPS is set for Aug 26-29, 2009 at Harvard Medical school's Joseph Martin Conference center. IBMISPS is also intended for the purpose of promoting the public welfare through the advancement of Intraoperative Surgical Planning and Brain Mapping, by a commitment to excellence in education, and by dedication to research and scientific discovery. This society promotes the public welfare and improves patient care through the translation of new technologies into life saving diagnostic and therapeutic procedures. The society is committed to excellence in education, and scientific discovery. The society achieves its mission through multi-disciplinary collaborations with government agencies, patient advocacy groups, educational institutes and private sector (industry) as well as philanthropic organization. All talks will be available for podcasting on line and special issue will be published by www.Elsevier.com

15. SUBJECT TERMS
Brain mapping, Cellular Imaging, Neuro-Navigation, Neurosurgery, Nanomedicine, OR & Hospital of the Future, Informatics, endoscopy, Biophotonics, Robotics, Brain Injury, PTSD, Spine, ……

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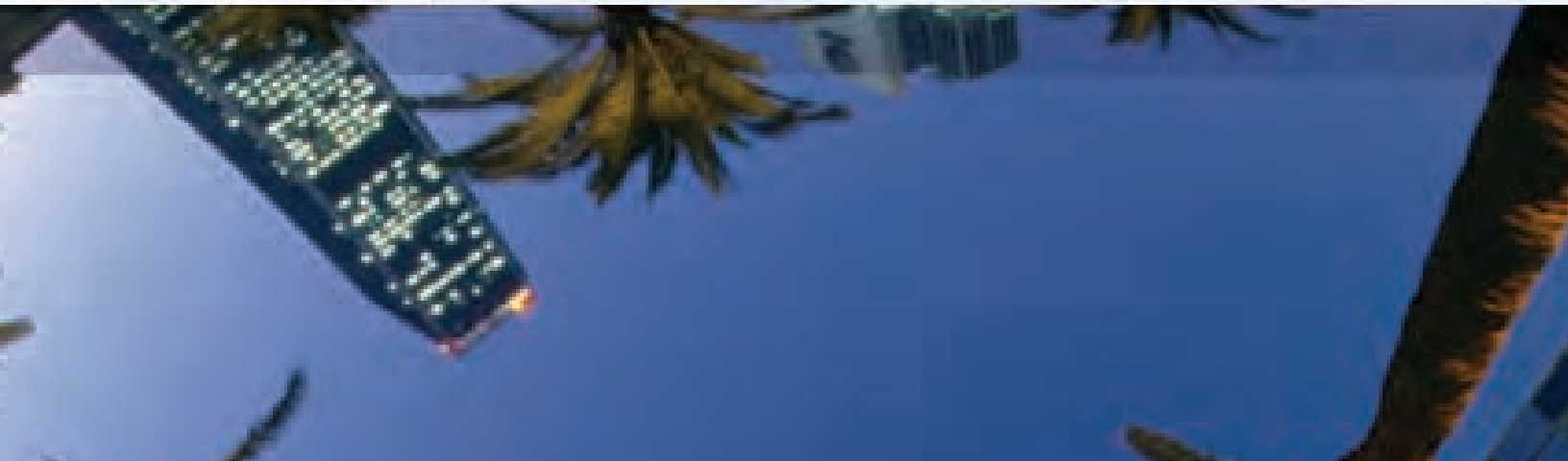
5th Annual
World Congress of IBMISPS
August 26-29, 2008

Held at
The University of California, Los Angeles



Contents

Mission Statement and Educational Objectives

MISSION STATEMENT

IBMISPS is a non-profit organization designed to encourage all scientists who are interested or currently active in areas of Brain Mapping (BM) and Intraoperative Surgical Planning (ISP) to share their findings with other physicians and scientists across the disciplines.

The Society also promotes public welfare through the advancement of ISP and BM, its commitment to excellence in education, and by dedication to research and scientific discovery.

The mission of IBMISPS will be achieved through a multidisciplinary collaboration of government agencies, patient advocacy groups, educational institutions, and the private sector. Together, issues related to Brain Mapping and Intraoperative Planning can be addressed and new technologies implemented to benefit patient care.

EDUCATIONAL OBJECTIVES

Upon completion of the scientific meeting, participants should be able to:

- Identify new findings in brain mapping and Intraoperative surgical planning most relevant to their own field, such as molecular imaging or biophotonics.
- Describe the effect of newly developed methods in Brain Mapping and Intraoperative Surgical Planning.
- Discuss and design the possible future research and developments in Brain Mapping and Intraoperative Surgical Planning, and assess the possible impact of such research and development on their own clinical and scientific work.
- Describe and assess the latest technology in Brain Mapping and Intraoperative surgical planning.
- Explain ways to build a bridge between the fields of BM and ISP.
- Discuss and describe governmental agencies roles in research and development of BM & ISP.

Board of Directors

Founder's Address

It is my great pleasure and honor to welcome members of our society, scientists, physicians, and members of industry, academia, and government officials to the 5th annual World Congress of IBMISPS. This year's theme is 'Breaking Boundaries to Shape the Future.' We conduct this meeting at UCLA-California Nano-System Institute (CNSI) to build a broad-based multidisciplinary collaborative society focused on image guided therapy and intervention.

IBMISPS brings together a diverse scientific, medical, and engineering community to tackle complex problems and diseases in the field of neuroscience and medicine. Therefore, the society facilitates unprecedented cross-disciplinary interactions among all scientific fields. In just 5 years, Japan, India, France, China, and the UK have joined the society and IBMISPS actively seeks the participation of other countries. IBMISPS will achieve its vision through establishing government relations and encouraging the interdisciplinary approach to scientific technological advancements and the formation of better healthcare and research policies for each country.

We also encourage the formation of student chapters in the universities around the world to cultivate and train future generations of scientists, physicians, surgeons, and policy makers who take a multidisciplinary approach in solving difficult issues. This could facilitate a true interaction and partnership can then take place among academia, government, and IBMISPS. This allows the exchange of ideas across the world, bridges cultural boundaries, and contributes to better global and regional healthcare, health policies, and scientific progress.

I would like to thank the IBMISPS board of directors and organizing committee members for their hard work and dedication in making this congress a success. I also thank Dr. Patrick Soon-Shiong, Chairman and CEO of Abraxis BioScience for his visionary and generous support of this program. This program may not have been possible without the generous contributions from US Army-TATRC, DVBIC, Abraxis BioScience, BrainLab, Codman, Carl Zeiss, Integra-Radionics, Optivus, NordicNeuroLab, and Siemens Japan.

I would like to thank Dr. Walter Koroshetz of NINDS, Dr. Keyvan Farahani of NCI, and Dr. Shouleh Nikzad of NASA/JPL for their scientific contributions to this program. I also want to thank Associate Dean of Research at UCLA David Geffen School of Medicine Dr. Lenny Rome and his staff for making this program possible at UCLA-CNSI.

I congratulate IBMISPS award recipients of this year:

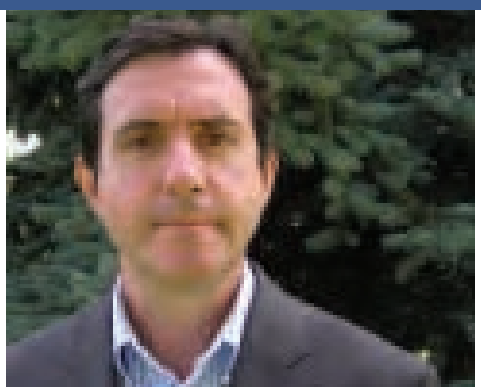
- The Honorable Governor Arnold Schwarzenegger for receiving the Pioneer and Healthcare award for his support of the stem cell research initiative in California and his visionary approach to scientific advancement and discovery.
- Two-time Oscar winner Actor Dustin Hoffman for receiving the Beacon Award for his role of an Autistic Savant in the movie The Rain Man. He increased awareness of autism and neurological diseases and stem cell research.
- Mark L. Vachon (President and CEO of GE Healthcare) for receiving the Pioneer and Technology Crystal award.
- Dr. Ron Kikinis for receiving the Pioneer and Medicine Crystal award. He is a leader in his field.

We welcome His Majesty Reza Pahlavi and Senator Mark Ridley Thomas and thank them for sharing their interdisciplinary vision with the members of IBMISPS. Finally, I thank all members of IBMISPS for their participation in this meeting and hope to see you next year at Harvard Medical School.

Respectfully,

Babak Kateb
Chairman of the Board of Directors, IBMISPS-Foundation
Founding Executive Director, IBMISPS
Managing Editor IBMISPS-NeuroImage
Visiting Researcher California Institute of Technology

Address from Jean-Jacques Lemaire



Dear Fellows, Colleagues, Friends,

The Congress for Brain Mapping and Image Guided Therapy is organized for the 5th time.
This year we go back to the source in Los Angeles where, in 2004, a group of passionate people from different horizons thought it was possible to speed the technological translational research in clinical neurosciences. To pursue this quest is more challenging than ever because the progresses in clinical neurotechnologies are major and exponential. They let foresee important spin-offs in health care, some of which being already available in the most advanced teams. The board of the IBMISPS is proud to encourage a cutting-edge research and meanwhile to spread smart technologies ready for clinical practice. The trans disciplinary approach is always in the core of the process, leading fascinating opportunities for those who want to follow this unconventional stream. The annual meeting is the best opportunity to meet colleagues and share stimulating data through highly scientific discussions, within a friendly organization. At last, the IBMISPS also gives the chance to publish works of excellence in a special issue of NeuroImage, and facilitates exchanges of researchers between clinic and laboratory.

On behalf of the board of the IBMISPS, welcome in Los Angles, in August 26 -29, 2008, we are happy to meet you and share our passion, aiming to give the best for people suffering of neurological diseases and handicaps.

Sincerely,

Jean-Jacques Lemaire
Director European Division - IBMISPS
University Hospital of Clermont-Ferrand
Professor of Neurosurgery
Auvergne University, France
IBMISPS President 2008-2009

Address from Warren Grundfest

I am pleased to welcome members of our Society, scientists, physicians, engineers, and members of industry, academia, and government to the 5th Annual Meeting of IBMISPS. This year's meeting, held in collaboration with the UCLA Nanosystems Institute, highlights an important and rapidly growing area of research and scientific investigation. We hope that this meeting will promote collaboration between scientists and engineers developing nanotechnology, and neuroscientists, neuro-radiologists, clinicians, and industry working on brain mapping, intraoperative neurosurgical techniques, and related fields.

Our Society was founded to bring together diverse scientific and engineering communities to focus on topics related to brain imaging and brain mapping for improved diagnosis and treatment of neurologic diseases. The application of nanotechnologies to neuroscience requires interdisciplinary efforts and collaboration across the spectrum of scientific investigators. We hope that this meeting will be one of many that reports significant advances in the neurosciences as nanotechnologies are incorporated into neuroscience research.

As a Society we recognize that advances in the laboratory must be translated by industry, with the assistance of government, into practical clinical methods. The goal of this symposium is to enhance communication between subspecialty physicians, scientists, and clinicians and their collaborators in industry and government. While many applications of nanotechnology to neuroscience are in early stages, we hope that this symposium will increase awareness among the participants to the potential benefits these emerging technologies. At the same time we believe that this meeting will serve as a forum to update participants on recent advances in other equally important brain mapping technologies and intraoperative surgical techniques.

Our educational mission extends beyond the scientific community to policy makers and the public. We believe that education is the key to the understanding of healthcare needs for those with brain diseases. Public support for brain mapping and related research and improved surgical techniques is essential for continued progress in the treatment of brain-related diseases. Recent events have focused public attention on the need for improved diagnosis and therapy of traumatic brain injury and post-traumatic stress disorder. Application of brain mapping techniques and advanced brain imaging modalities may help to improve the diagnosis, characterization, and therapy of these devastating diseases.

I am most appreciative of the Society's willingness to hold this meeting at my institution, UCLA, which has been in the forefront of nanotechnologies and neuroscience research. Once again, I welcome you all to UCLA, and I hope that you all find this a productive and enjoyable meeting.

Warren S. Grundfest, M.D. FACS
Professor of Bioengineering & Electrical Engineering
The Henry Samueli School of Engineering & Applied Science

Professor of Surgery
David Geffen School of Medicine
UCLA

Portfolio Manager, Nanomedicine and Biomaterials
Senior Scientist
TATRC (The Telemedicine and Advanced Technology Research Center)
U.S.Army Research and Materiel Command

Address from Patrick Soon-Shiong

Dear Colleagues,

Welcome to the fifth annual IBMISPS Congress, an opportunity to explore ground-breaking science with elite basic and clinical scientists. The discovery of innovative means to diagnose and deliver therapeutics to an ever-growing and diversifying population of CNS patients requires pioneering and cooperative science, the likes of which this congregation of technologists promises to deliver.

With our partners at the California NanoSystems Institute at UCLA, we at Abraxis BioScience are proud to participate in this important scientific event. Abraxis BioScience is a fully integrated biotechnology company dedicated to meeting clinical needs through paradigm-shifting innovations. The discovery, development, and clinical application of our proprietary receptor-mediated tumor-targeting technology has been a boon to treating cancer and established a new paradigm of targeted nanoparticle cytotoxic chemotherapeutic agents. This innovation has inspired us to further support interdisciplinary collaborative research that aims to discover clinically-applicable next-generation technologies.

Improved neurosurgical techniques and tools for neuroimaging and brain mapping are required for treating medical impossibilities such as neurodegenerative diseases and inoperable brain cancer. The discovery process towards break-through therapies will be significantly accelerated through multidisciplinary research and innovation. Thus it is my sincere hope that the eclectic group of scientists gathered at this congress will expand the realm of possibilities for each researcher and promote cross-disciplinary collaboration.

California NanoSystems Institute at UCLA has been built entirely on the spirit of multidisciplinary cooperation amongst elite engineers, clinicians, and basic scientists. Charged with continuing UCLA's tradition for making life-improving discoveries, CNSI leverages its intellectual capital to make outside-the-box discoveries that are readily translated into commercial product by its industry partners: Abraxis BioScience, Hewlett-Packard, Intel, and BASF. For us at Abraxis BioScience, CNSI has thus become the hub for interdisciplinary exchange of information.

I hope you share in my excitement for exploring revolutionary medicine at the fifth annual IBMISPS congress.

Sincerely,

Patrick Soon-Shiong, M.D.
Chairman and Chief Executive Officer
Abraxis BioScience

Address from Leonard Rome

Dear Colleagues,

The California NanoSystems Institute is pleased to serve as the host venue of the 5th World Congress of the International Brain Mapping and Intraoperative Surgical Society (IBMISPS).

Over the next few days, selected scientists, educators and technology leaders who are at the vanguard of new treatments for brain and spinal cord injuries and diseases will converge to share innovations and advances. Their work underscores the benefits of multi-disciplinary collaboration which serve to bridge science and technology to accelerate medical breakthroughs.

This multi-disciplinary approach closely parallels the work conducted at CNSI. At the nanoscale, materials exhibit strikingly different properties. A multidisciplinary approach is required to fully understand and manipulate these qualities. CNSI members are drawn from faculty in engineering, medicine, and physical and life sciences. These scientists benefit from an integrated laboratory culture enabling them to conduct dynamic research at the nanoscale which will lead to breakthroughs in medicine, as well as information technology, environmental protection, and new sources of energy.

The CNSI is an integrated research center whose mission is to foster interdisciplinary collaborations for discoveries in nanosystems and nanotechnology; train the next generation of scientists, educators and technology leaders; and facilitate partnerships with industry, fueling economic development and promoting social well being. Working in a dynamic, collaborative environment, supported by the physical and human resources of UCLA, CNSI members are investigating nanoscale phenomena in new and innovative ways.

The IBMISPS meeting will provide an exciting opportunity to learn about the newest innovations from those leaders who are driving the discoveries of new medical therapies and diagnostic tools which will transform technologies aimed at treating brain trauma and spinal cord injuries and diseases.

Sincerely,

Leonard H. Rome
Director, California NanoSystems Institute
Senior Associate Dean for Research, David Geffen School of Medicine, UCLA

Keynote Speaker

Leonard Rome

BIOGRAPHY

Leonard H. Rome, Ph.D.
Interim Director, California NanoSystems Institute
Senior Associate Dean for Research
David Geffen School of Medicine at UCLA

Leonard H. Rome is a cell biologist and biochemist who has served on the UCLA School of Medicine faculty since he joined the Department of Biological Chemistry in 1979. He became a full professor in 1988 and has been Senior Associate Dean for Research in the School of Medicine since 1997. Dr. Rome earned his B.S. in Chemistry and M.S. and Ph.D. in Biological Chemistry at the University of Michigan, Ann Arbor. He was a postdoctoral fellow at the National Institutes of Health, where he worked on lysosome biogenesis. Dr. Rome has chaired the School of Medicine Faculty Executive Committee and is actively involved in graduate and medical education. He is a recipient of the School of Medicine Award for Excellence in Education. Since becoming Senior Associate Dean for Research, he has organized a strategic plan for research in the School and spearheaded campus-wide efforts in genomics, proteomics, and computational biology. His laboratory research centers on a novel cellular organelle called a "vault" which was discovered in his laboratory. Dr. Rome is presently organizing a Nanoscience Interdisciplinnary Research Team, a collaboration of disciplines including cell biologists, engineers, chemists, and structural biologists who will engineer vaults so that they may one day be used in drug delivery and as components of nano-electrical machines.

Tuesday August 26

8:00am - 5:00pm — **Sponsor Exhibitions in CNSI Lobby**
Poster Sessions

Welcome and Introduction

7:30 - 8:00am

OFFICIAL WELCOME AND INTRODUCTION
By Congress Chairmen:

Babak KATEB
Founding Executive Director & Chairman of the Board of Directors IBMISPS

Jean Jacques LEMAIRE
President of IBMISPS (2008-2009)

8:00 - 8:45am

KEYNOTE SPEAKER
Leonard ROME, PH.D.
Interim Director, California NanoSystems Institute
Professor, Biological Chemistry
Senior Associate Dean of Research, David Geffen School of Medicine at UCLA

Nanoparticles for Therapeutic Drug Delivery: An Introduction to the CNSI

8:45 - 9:15am

TWO TIME ACADEMY AWARD WINNER ACTOR
Dustin HOFFMAN

RECIPIENT OF THE 2008 IBMISPS BEACON AWARD:
Dedication and Courage to increase awareness about Autism

Rain Man and Autisim

9:15 - 9:35am

THE HONORABLE STATE SENATOR
Mark Ridley THOMAS
Chair of the Committee on Business, Professions and Economic Development
Chair of the Senate Select Committee on L.A. County Health Care Crisis
Chair of the California Legislative Black Caucus

Research and Healthcare in California

Scientific Session 1: Image Guided Therapy

9:35 - 9:50am

CHAIR:
Warren S. GRUNDFEST, M.D. FACS
Professor of Bioengineering & Electrical Engineering
The Henry Samueli School of Engineering & Applied Science
Professor of Surgery, UCLA - David Geffen School of Medicine

Nanotechnologies Applied to Brain Mapping: New Opportunities for Interdisciplinary Research

Tuesday August 26

Scientific Session 1: **Image Guided Therapy** *(Cont.)*

9:50 - 10:05am

CO-CHAIR:
John D. HEISS, M.D.
Head of Clinical Unit
Surgical Neurology Branch,
National Institute of Neurological Disorder and Stroke,
National Institute of Health

Real-time Guidance of Brain Tumor Surgery using Intraoperative MRI and Bipolar Cortical Mapping

10:05 - 10:20am

Keyvan FARAHANI, Ph.D.
Acting Branch Chief
Cancer Imaging Program National Cancer Institute

Funding Opportunities in Image-Guided Oncological Interventions

9:50 - 10:05am

Sujit S. PRABHU, M.D., FRCS
Assistant Professor
Department of Neurosurgery
MD Anderson Cancer Center

Use of Intraoperative High-field MRI (iMRI) and Brain Mapping in the Resection of Subcortical (Deep) Brain Tumors

10:35 - 10:45am

Q & A

10:45 - 11:00am

COFFEE BREAK

Scientific Session 2:
Imaging and Intraoperative Surgical Planning

11:00 - 11:15am

KEYNOTE SPEAKER
CO-CHAIR:
Ron KIKINIS, M.D.

2008 IBMISPS PIONEER IN MEDICINE AWARD:
Excellence in Research, Discovery and Education

Founding Director of Surgical Planning Laboratory
Director of The National Center for Image Guided Therapy
Professor of Radiology Department of Radiology
Brigham & Women's Hospital,
Harvard Medical School, Boston, USA

The Role of Software in Image Guided Therapy

Scientific Session 2:
Imaging and Intraoperative Surgical Planning *(Cont.)*

11:15 - 11:30am

CHAIR:
Jean Jacques LEMAIRE, M.D., Ph.D.
University Hospital of Clermont-Ferrand
Professor of Neurosurgery (ESPRI/INSERM),
Auvergne University, France

DTI and Tractography for DBS: Image-Guided Anatomic Approach

11:30 - 11:45am

Shoichiro ISHIHARA, M.D., Ph.D.
Associate Professor, Department of Neurosurgery
Chief of Division of Endovascular Neurosurgery, Stroke Center,
International Medical Center, Saitama Medical University, Japan

Combined Approach for Cerebrovascular Surgery in a Hybrid Operating Room

11:45 - 12:00pm

Col. Ken CURLEY, M.D.
Neuroscience Portfolio Manager, Telemedicine and Advanced Technology Research Center (TATRC),
U.S. Army Medical Research and Materiel Command (MRMC),
Special Consultant to the Director, Center for Disaster and Humanitarian Assistance Medicine (CDHAM),
Assistant Professor of Military and Emergency Medicine, Surgery and Biomedical Informatics,
Uniformed Services University of the Health Sciences (USUHS)

Neuroscience Research at the U.S. Army Telemedicine and Advanced Technology Research Center: Opportunities for Engaging the Brain Mapping and Intraoperative Surgical Planning Communities

12:00 - 12:15pm

Michael R. CHICOINE, M.D.
Associate Professor
Department of Neurosurgery
Washington University School of Medicine

Implementation and Preliminary Clinical Experience with the Use of Ceiling Mounted Mobile High Field Intraoperative Magnetic Resonance Imaging

12:15 - 2:00pm

LUNCH BREAK

Scientific Session 3:
Vascular and Blood Flow Imaging and Stroke

2:00 - 2:15pm

CHAIR:
Elizabeth BULLITT, M.D.
Van Weatherspoon Jr. Professor of Surgery,
Director of CASILab, University of North Carolina,
Chapel Hill, NC

Glioma and Vessel Shape as Monitored by Magnetic Resonance Angiography (MRA)

Tuesday August 26

Scientific Session 3:
Vascular and Blood Flow Imaging and Stroke *(Cont.)*

2:15 - 2:30pm

CO-CHAIR:
S. Thomas CARMICHAEL, M.D., Ph.D.
Associate Professor
Department of Neurology
David Geffen School of Medicine at UCLA

Neural Connections After Stroke As One Of The Mechanisms of Brain Repair In This Disease

2:30 - 2:45pm

Don M. TUCKER, Ph.D.
Electrical Geodesics, Inc.
Department of Psychology and NeuroInformatics Center, University of Oregon

MR-Constrained Dense Array EEG for Estimating Neural Sources of Epileptic Seizures in Neurosurgical Planning

2:45 - 3:00pm

Wang ZHAN, Ph.D.
Assistant Professor
Center for Imaging of Neurodegenrative Diseases
Department of Radiology
University of California, San Francisco (UCSF)
VA Medical Center

Capture White Matter Degeneration with Diffusion MRI and Multimodal Analysis

3:00 - 3:15pm

Aaron FILLER, M.D., Ph.D.
Medical Director of Neurography Institute

Image guided systems Impact of Image Cycle Time in Minimal Access Nerve Surgery and Interventional MRI

3:15 - 3:30pm — **Q & A**

3:30 - 4:00pm — **TEA RECESS**

Scientific Session 4: **NEW HORIZON**

4:00 - 4:15pm

CHAIR:
Farzad MASSOUDI, M.D.
Assistant Clinical Professor of Neurological Surgery,
UCLA School of Medicine

Future of Neurosurgery

Scientific Session 4: **NEW HORIZON** *(Cont.)*

4:15 - 4:30pm

CO-CHAIR:
Elaine L. BEARER, M.D., Ph.D.
Professor,
Department of Pathology and Laboratory Medicine
Warren Alpert Medical School of Brown University

Emerging Concepts in Neuroimaging: Animal Models, Plasticity and Circuitry

4:30 - 4:45pm

Jonathan NISSANOV, Ph.D.
Associate Professor,
Department of Neurobiology & Anatomy
Drexel University College of Medicine

Brain Spatial Normalization: Indexing the Mouse Brain Library

4:45 - 5:00pm

Margret Amy RYAN, Ph.D.
Principal Investigator
NASA/Jet propulsion Laboratory (JPL)

Electronic Nose

5:00 - 5:15pm

SPECIAL TOPIC: BIOETHICS
Andrea A. SCOTT, J.D.
President and CEO of Bioethics USA, Inc

Post Traumatic Stress Disorder in the 21st Century: Deconstructing the Historic Scarlet Letter

5:15pm **TEA RECESS**

Keynote Speakers

His Majesty Reza Pahlavi

BIOGRAPHY

Since the establishment of the clerical regime in Iran and the passing of his father, the late Shah of Iran, Reza Pahlavi has been a leading and vocal advocate of the principles of freedom, democracy and human rights for his compatriots. He is an international speaker and the author of "Past and the Future" published in June 2000 in Persian, and "Winds of Change: The future of Democracy in Iran" published in 2002.

Reza Pahlavi has lectured in many respected academic institutions, including the Washington Institute of Foreign Affairs, Yale University, Harvard Business School, Cornell, George Town University, Hudson Institute, University of Nebraska, and Management Centre Innsbruck of Austria. His topics included, Iran and the future of the Middle East and Peace and Stability in the Middle East and Beyond.

His articles have been published in various reputable newspapers and magazines, including the Washington Post, Newsweek International, Le Figaro, The Wall Street Journal, and the New Republic.

In 1978, Reza Pahlavi, then Crown Prince of Iran, left his homeland to complete his higher education in the United States. An accomplished jet fighter pilot, Reza Pahlavi completed the United States Air Force Training Program at the former Reese Air Force Base in Lubbock, Texas. He is a Political Science graduate of the University of Southern California.

Soon-Shiong, M.D.

BIOGRAPHY

Dr. Soon-Shiong became chairman and chief executive officer of Abraxis BioScience in April 2006. Dr. Soon-Shiong previously served APP as president since July 2001 and chief executive officer and chairman of the board of directors from its inception in March 1996. Since June 1994, Dr. Soon-Shiong also served as president, chief financial officer and a director of American BioScience, Inc. From June 1994 to June 1998, he served as chief executive officer and chairman of the board of directors of VivoRX, Inc., a biotechnology company. Dr. Soon-Shiong is named as a co-inventor on over 40 issued U.S. and foreign patents and is a fellow of the American College of Surgeons and the Royal College of Physicians and Surgeons of Canada. Dr. Soon-Shiong holds a degree in medicine from the University of the Witwatersrand and a M.Sc. in science from the University of British Columbia.

Wednesday August 27

8:00am - 5:00pm — **Sponsor Exhibitions in CNSI Lobby**
Poster Sessions

9:00am - 12:30pm — **Board of Director's Meeting**

Introduction

12:40 - 1:00pm

Warren S. GRUNDFEST, M.D. FACS
Professor of Bioengineering & Electrical Engineering
The Henry Samueli School of Engineering & Applied Science
Professor of Surgery, UCLA- David Geffen School of Medicine

12:50 - 1:00pm

KEYNOTE SPEAKER:
His Majesty Reza PAHLAVI

Interdisciplinary Medicine: The Way of the Future

1:00 - 1:40pm

KEYNOTE SPEAKER:
Patrick Soon-SHIONG, M.D.
Chairman of the Board of Directors and
Chief Executive Officer of
ABRAXIS BIOSCIENCE

The Need for Interdisciplinary Science to Effect Meaningful Clinical Change

1:40 - 1:45pm — Q & A

1:45 - 2:00pm — COFFEE BREAK

Scientific Session 5: New Frontiers in Medicine (I) Technology and Nanomedicine

2:00 - 2:15pm

CHAIR:
Babak KATEB
Founding Executive Director
Chairman of the Board of Directors IBMISPS

Internalization of MWCNTs by Microglia:
Possible Application in Immunotherapy of Brain Tumors

2:15 - 2:30pm

CO-CHAIR:
Shouleh NIKZAD, Ph.D.
Head of Nanoscience and
Advanced Detector Arrays Group,
Jet Propulsion Laboratory (JPL)

UV Technology Imaging

Wednesday August 27

Scientific Session 5: New Frontiers in Medicine (I) Technology and Nanomedicine *(Cont.)*

2:30 - 2:45pm

Behnam BADIE, M.D.
Director of Brain Tumor Program and
Director of Neurosurgery Department
City of Hope National Cancer Center

Nanotechnology and Immunotherapy of Brain Cancers

2:45 - 3:00pm

T. K. HSIAI, M.D., Ph.D.
Director of Cardiovascular Engineering Research Core
Associate Professor
Department of Biomedical Engineering &
Division of Cardiovascular Medicine
University of Southern California

Shear Stress and Vascular Oxidative Stress from Micro to Nanotechnologies

3:00 - 3:15pm

Michael E. HONEK, Ph.D.
Senior Member of Technical Staff
Nano and Micro Systems (NAMS)
In-Situ Instrument Systems Section
California Institute of Technology

From Brain Mapping to Space Exploration -What can NASA engineers learn from neurobiologists about building spacecraft?

3:15 - 3:30pm Q & A

3:30 - 4:00pm TEA RECESS

Scientific Session 6: New Frontiers in Medicine (II) Genetic Imaging and Drug Delivery

4:00 - 4:15pm

CHAIR:
Mike CHEN, M.D., Ph.D.
Assistant Professor,
Department of Neurosurgery
City of Hope National Cancer Center, CA

CO-CHAIR:
Pedro R. LOWENSTEIN, M.D., Ph.D.
Director
Board of Governors
Gene Therapeutics Research Institute
Bram and Elaine Goldsmith
Chair in Gene Therapeutics
Cedars-Sinai Medical Center
Professor of Medicine, and Pharmacology
Departments of Medicine, and Molecular and Medical Pharmacology
David Geffen School of Medicine UCLA

Immunological Synapses: the Anatomical Substrate Mediating Anti-Viral and Anti-Tumor Responses in the Brain

Scientific Session 6: **New Frontiers in Medicine (II)**
Genetic Imaging and Drug Delivery *(Cont.)*

4:15 - 4:30pm

Bong Seop LEE, Ph.D.
Research Scientist,
Maxine Dunitz Neurosurgical Institute,
Department of Neurosurgery,
Cedars-Sinai Medical Center

Nanoprodrugs: A New Paradigm in the Prodrug Strategy

4:30 - 4:45pm

Krystof BANKIEWICZ, M.D., Ph.D.
Professor of Neurosurgery and Neurology
UCSF School of Medicine

Presented by
Francisco VALLES, B.S. B.A., M.S. II
UCSF School of Medicine

Imaging of Gene Transfer in Parkinson's Disease

4:45 - 5:00pm

Mirjana MALETIC-SAVATIC, M.D., Ph.D.
Assistant Professor of Neurology
Baylor College of Medicine

Metabolomics and Magnetic Resonance Spectroscopy:
A New Approach for Biomarker Discovery

5:00pm

Q & A
TEA RECESS

Keynote Speakers

Christian Macedonia, M.D.

BIOGRAPHY

LTC(P) Christian Macedonia M.D. is a US Army physician and surgeon, currently serving as the Chief of Research Operations at the Telemedicine and Advanced Technology Research Center (TATRC) at Fort Detrick, Maryland. Before assuming his current position, Dr. Macedonia served in a variety of roles throughout the military and civilian healthcare system. He led an ambulance platoon in Germany during the Cold War. He worked as an Army scientist and the medical primary investigator in the development of the 3D ultrasound for trauma care.

Dr. Macedonia provided medical and scientific support to two successful Everest climbing teams in 1998 and 1999 while doing a research fellowship at the National Institutes of Health. He dove 12,800 ft. in a Mir submersible to the RMS Titanic in 2000 and taught high altitude survival skills to special operating forces in 2001 and 2002.

Dr. Macedonia was the Medical Director for Women's and Children's Health at the National Naval Medical Center in Bethesda and served a year as the Chief of Clinical Staff of the 115th Combat Support Hospital in the Anbar Province of Iraq where he was awarded the Bronze Star.

In addition to his current duties, LTC Macedonia serves on the secretariat of the Defense Science Board. He assumes new duties at the Pentagon as the Medical Sciences Advisor to the Joint Chiefs of Staff in September. Dr Macedonia is the recipient of numerous military and civilian awards, including the Heroes of TRICARE award given to the Department of Defense's most outstanding health professionals and he was co-recipient of the Discover Magazine Award in Science and Technology.

Thursday August 28

8:00am - 5:00pm — **Sponsor Exhibitions in CNSI Lobby**
Poster Sessions

Welcome and Introduction

8:00 - 8:30am

OFFICIAL WELCOME AND INTRODUCTION
By Chairmen:

Stephan ERBERICH &
Babak KATEB

8:30 - 9:00am

KEYNOTE SPEAKER
Christian MACEDONIA, M.D.
Lieutenant Colonel, Medical Corps, US Army
Chief of Research Operations
Telemedicine and Advanced Technology Research Center
U.S. Army Medical Research and Materiel Command (MRMC)
Associate Professor of Ob/GYN,
Military and Emergency Medicine Uniformed Services University

Brain Mapping and Systems Biology

Scientific Session 7: Multi-Modality Imaging

9:00 - 9:15am

CHAIR:
Alexandra GOLBY, M.D.
Assistant Professor of Neurosurgery,
Associate Surgeon, Brigham and Women's Hospital
Director of Image Guided Neurosurgery,
Brigham and Women's Hospital,
Harvard Medical School

Improving Pre-operative Language Lateralization and Localization Using Advanced fMRI Analysis

9:15 - 9:30am

Manbir SINGH, Ph.D.
Professor of Radiology and Biomedical Engineering,
Founding Director of Biomedical Imaging & Telemedicine Program,
Director of ADRC Neuroimaging Core
University of Southern California

Quantitative DTI with Applications to Traumatic Brain Injury and Alzheimer Disease

9:30 - 9:45am

CO-CHAIR:
Aaron COHEN, M.D. M.S.
Assistant professor of neurosurgery
Indiana University School of Medicine

Use of Diffuse Tensor Imaging in Surgical Planning and Resection of Insular Gliomas

Thursday August 28

Scientific Session 7: **Multi-Modality Imaging** *(Cont.)*

9:45 - 10:00am

Ramon DIAZ-ARRASTIA, M.D., Ph.D.
Professor, Department of Neurology
University of Texas Southwestern Medical Center

Multimodality Magnetic Resonance Imaging Biomarkers of Traumatic Axonal Injury

10:00 - 10:15am

Guido GERIG, Ph.D.
Professor of Computer Science,
School of Computing
Member of the Scientific Computing and Imaging Institute (SCI)
Member of the Brain Institute
Director Center for Neuroimage Analysis
Adjunct Professor Utah Departments of Psychiatry and Biomedical
University of Utah

Analysis of Brain White Matter Properties and Fiber Tracts Via Diffusion-Weighted MRI: Challenges and Potential Benefits

10:15 - 10:30am — **Q & A**

10:30 - 11:00am — **LUNCH BREAK**

Scientific Session 8: **Global Health Grid: Toward Electronic Medical Records and Advanced Telemedicine**

CHAIRS:
Dr. Stephan ERBERICH (ISI/USC),
Dr. Carl KESSELMAN (ISI/USC)

11:00 - 11:20am

Johan MONTAGNAT, Ph.D.
French National Center for Scientific Research (CNRS)

Neuroscience Discovery with Grid Computing

11:20 - 11:40am

Michael WILDE, B.Sc.
Fellow, Computation Institute, University of Chicago Software Architect,
Argonne National Laboratory

Swift Supercomputing Analysis in CNARI: Computational Neuroscience and Aphasia Research Infrastructure

11:40 - 12:00pm

James PHILBIN, Ph.D.
Senior Director Medical Informatics
Johns Hopkins University

The Design of a DICOM Compatible Storage Grid with ILM

12:00 - 12:15pm — **Q & A**

12:15 - 2:00pm — **LUNCH BREAK**

Thursday August 28

Scientific Session 9:
Traumatic Brain and Spinal Cord Injury and PTSD

2:00 - 2:15pm

CHAIR:
David MOORE, M.D.
Deputy Director for Research,
Defense and Veterans Brain Injury Center,
Walter Reed Army Medical Center

Computational Biology, Primary Blast Injury and the Central Nervous System

2:15 - 2:30pm

CO-CHAIR:
Amir VOKSHOOR, M.D.
Co-founder of Neurosurgical & Spine Institute
Diagnostic and International Spine Center Institute
St. Johns Medical Center
West Hills medical Center

Neurosurgical Repair in Cervical Trauma

2:30 - 2:45pm

Elaine ALEXANDER, M.D., Ph.D.
Cenomed BioSciences, LLC
Vice President Clinical Development
Chief Medical Officer (CMO)

The Development of Multi-Function Therapeutics for PTSD and PTE in War Fighters Injuries (TBI)

2:45 - 3:00pm

Michael J. ROY, M.D., M.PH.
Colonel, Medical Corps, U.S. Army
Director, Division of Military Internal Medicine Professor of Medicine Uniformed Services
University of the Health Sciences

ViRTICo: Virtual Reality Therapy and Imaging in Combat Veterans with PTSD and Mild TBI

3:00 - 3:15pm

Akemi TOMODA, M.D., Ph.D.
Department of Psychiatry, Harvard Medical School,
Developmental Biopsychiatry Research Program,
McLean Hospital, Belmont,
Child Developmental Sociology,
Faculty of Medical and Pharmaceutical Sciences
Kumamoto University, Kumamoto, Japan

Prefrontal Cortex Involvement as Adverse Effects of Harsh Corporal Punishment in Childhood on Brain Gray Matter Volume

3:15 - 3:30pm — **Q & A**

3:30 - 4:00pm — **TEA RECESS**

Thursday August 29

Scientific Session 10:
Biophotonic and Image Guided Therapy

4:00 - 4:15pm

CHAIR:
E. Duco JANSEN, Ph.D.
Associate Professor of Biomedical Engineering
Department of Biomedical Engineering
Vanderbilt University School of Engineering

Optical Stimulation in the CNS

4:15 - 4:30pm

Jonathan NISSANOV, Ph.D.
Associate Professor,
Department of Neurobiology & Anatomy
Drexel University College of Medicine

Cryoplane Fluorescence Microscopy

4:30 - 4:45pm

CO-CHAIR:
Nathalie Y.R. AGAR, Ph.D.
Instructor in Surgery, Department of Neurosurgery
Brigham and Women's Hospital, Harvard Medical School

Mass Spectrometry Approaches to Intraoperative Surgical Planning

4:45 - 5:00pm

Mark BENDETT, Ph.D.
Director of Medical Products
Aculight Corporation
and
Jonathon WELLS, Ph.D.
Aculight Corp
Senior Scientist

Infrared Nerve Stimulation: A Selective Stimulus for Neural Mapping, Surgical Guidance, and Therapy

5:00pm

Q & A

TEA RECESS

6:00-9:00pm

COCKTAIL AWARD EVENT

Thursday August 28

Cocktail Award Event

6:00 - 9:00 pm

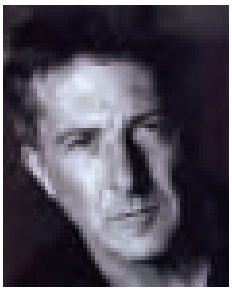
UCLA California Nanosystem Institute
(UCLA-CNSI)

Keynote Speaker: **HERB SCHULTZ**

Special Assistant to Governor Schwarzenegger

2008 AWARD RECIPIENTS

Beacon Award for Courage and Dedication



Dustin Hoffman

Pioneer in Medicine Award

Dr. Ron Kikinis

Pioneer in Healthcare Policy

Govenor Schwarzenegger

Pioneer in Technology

Mark L. Vachon

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ABOUT CNSI

The California NanoSystems Institute (CNSI) is an integrated research center — operating jointly at UCLA and UC Santa Barbara — whose mission is to foster interdisciplinary collaborations for discoveries in nanosystems and nanotechnology, to train the next generation of scientists, educators and technology leaders, and to facilitate partnerships with industry that will fuel economic development and the social well-being of California, the United States and the world.

The CNSI was established in 2000 with $100 million in funding from the state of California and an additional $250 million in federal research grants and industry funding. Scientists in the areas of biology, chemistry, biochemistry, physics, mathematics, computational science, and engineering are measuring, modifying and manipulating the building blocks of our world — atoms and molecules. These scientists benefit from an integrated laboratory culture enabling them to conduct dynamic research at the nanoscale, leading to significant breakthroughs in the areas of health, energy, environment and information technology. For additional information, visit www.cnsi.ucla.edu.

Cocktail Award Schedule of Events:

6:00 - 6:10pm **INTRODUCTION:**
Babak KATEB
Chairman of the Board of Directors, IBMISPS-Foundation
Founding Executive Director, IBMISPS
Managing Editor IBMISPS-NeuroImage
Visiting Researcher California Institute of Technology

6:10 - 6:30pm **KEYNOTE SPEECH:**
Herb SCHULTZ
Herb Schultz, of West Hollywood, has been appointed Senior Health Policy Advisor for the Office of the Governor in the state of California. Most recently, he has served as Vice President of Government Programs for McKesson Health Solutions, where he oversaw disease management and nurse advice government Medicaid and Medicare programs. Schultz previously was Acting Director of the California Employment Development Department and Acting Secretary and Undersecretary for the Labor and Workforce Development Agency. Prior to that, he was Deputy Director of External Affairs for the Department of Managed Health Care and served as Director of the Advisory Committee on Managed Health Care.

6:30 - 7:00pm **Award Presentation**

7:30 - 8:00pm **Break**

8:30 - 9:00pm **VIP Tour of UCLA's CNSI**

9:00pm **Closing Remarks**

Beacon Award for Courage and Dedication:
The Beacon Award is presented to individuals who have demonstrated extraordinary courage and dedication for increasing awareness about neurological diseases, and for patients and their families who have exceeded expectations in fighting a neurological disorder with unprecedented courage. The Beacon Award identifies remarkable individuals who set the highest standards for increasing awareness of, and fighting, neurological diseases.

Pioneer in Medicine:
The Pioneer in Medicine Award is presented to individuals who have significantly contributed to the scientific advancement in the fields of medicine and image guided therapy through a multi-disciplinary approach. Their groundbreaking contribution has made development of state-of-the-art technology and scientific discovery a reality.

Pioneer in Healthcare Policy:
The Pioneer in Healthcare Policy Award is presented to lawmakers who have demonstrated visionary and cross-disciplinary approaches to introducing laws that have contributed to the advancement of science, technology, education, and medicine. They have paved the way to better integration of such advancements in other fields, like medicine and neuroscience. These lawmakers champion better healthcare for all.

Pioneer in Technology:
The Pioneer in Technology Award is presented to the trail blazing companies and their CEOs/presidents who have facilitated the development of pioneering technologies through interdisciplinary approaches that have impacted diagnostics, treatment, and healthcare delivery in unprecedented ways.

AWARDS

Past Award Recipients:

2006: Warren Grundfest, Alim Louis Benabid

2007: Beacon Award, Benham Badie; Medicine, Richard Frakowiack, Arthur W. Toga, John Mazziotta; Technology, Steve Rusckowski; Healthcare Policy, Speaker Nancy Pelosi, Senator Edward Kennedy

AWARD Recepient Courage and Dedication

Two Time Oscar Winner Actor
Dustin Hoffman
Recipient of Beacon Award for Courage and Dedication

Dustin Lee Hoffman , born August 8, 1937, is a two-time Academy Award, six-time Golden Globe, three-time BAFTA and Emmy Award actor. Born in Los Angeles of a jazz pianist mother and prop supervisor/set decorator father, he graduated from Los Angeles High School. He began acting at the Pasadena Playhouse with fellow actor, Gene Hackman after a brief college term at Santa Monica City college. Hoffman followed Hackman to New York and the two worked odd jobs as they continued to improve their craft. During these years, Hoffman shared a small apartment with actor Robert Duval.

He studied at the famous Actors Studio and became a method actor. Through the early sixties he made numerous appearances on television and appeared in commercials, and in theatrical performances. Between acting jobs he taught acting at community colleges and directed off-Broadway productions.

In 1966, director Mike Nichols was casting for 'The Graduate' and eventually auditioned and hired Mr. Hoffman, who received an Academy Award nomination for his role in the film. His next films brought critical success and another Academy nomination including Midnight Cowboy and Little Big Man. He continued his string of successes in the next decade with such films as Papillon, Straw Dogs and Lenny. Less than two years after the Watergate scandal, Hoffman appeared in 'All the Presidents Men' with Robert Redford.

His movie successes continued as he explored comedy in 'Tootsie', reprising his early real life in New York as a struggling actor/director, and drama with in evocative role of a caring, divorced father in Kramer vs. Kramer. He has been considered for a number of roles including Michael Coreleone in the Godfather and Richard Decker in Blade Runner. In Rain Man, he appeared as an autistic savant opposite Tom Cruise. The film was a huge success and brought him his second Oscar.

When a family friend was diagnosed with Type I diabetes, Mr. Hoffman and his wife, Lisa Gottsegen, became involved with the Juvenile Diabetes Research Foundation, hosting its first fund raising event. The foundation's research efforts became embroiled in a larger controversy over the use of stem cells which Mr. Hoffman defended. "What this research has more to do with is not when life begins but when life ends," Mr. Hoffman is quoted as saying. "This research may one day eliminate these diseases from ending people's lives prematurely."

He is the father of six children and has two grandchildren. He is politically active and has long supported the Democratic Party.

AWARD Recepient Pioneer in Medicine

Professor Ron Kikinis, M.D.

Recipient of Pioneer in Medicine Crystal Award

Dr. Kikinis is the founding Director of the Surgical Planning Laboratory, Department of Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, and a Professor of Radiology at Harvard Medical School. This laboratory was founded in 1990.

Dr. Kikinis is the Principal Investigator of the National Alliance for Medical Image Computing (NA-MIC, a National Center for Biomedical Computing, an effort which is part of the NIH Roadmap Initiative), and of the Neuroimage Analysis Center (NAC a National Resource Center funded by NCRR). He is also the Research Director of the National Center for Image Guided Therapy (NCIGT), which is jointly sponsored by NCRR, NCI, and NIBIB.

During the mid-80's, Dr. Kikinis developed a scientific interest in image processing algorithms and their use for extracting relevant information from medical imaging data. Since then, this topic has matured from a fairly exotic topic to a field of science. This is due to the explosive increase of both the quantity and complexity of imaging data. Dr. Kikinis has led and has participated in research in different areas os science. His activities include technological research (segmentation, registration, visualization, high performance computing), software system development (most recently the 3D Slicer software package), and biomedical research in a variety of biomedical specialties. The majority of his research is interdisciplinary in nature and is conducted by multidisciplinary teams. The results of this research have been reported in a variety of peer-reviewed journal articles. He is the author and co-author of more than 260 peer-reviewed articles.

Before joining Brigham & Women's Hospital in 1988, he trained as a resident in radiology at the University Hospital in Zurich, and as a researcher in computer vision at the ETH in Zurich, Switzerland. He received his M.D. degree from the University of Zurich, Switzerland, in 1982.

AWARD Recepient Pioneer in Healthcare Policy

The Honorable Governor
Arnold Schwarzenegger
Recipient of Pioneer in Healthcare Policy Crystal Award

Arnold Schwarzenegger is currently the 38th Governor of California. He was born on July 30, 1947 in Thal, Austria just outside the Styrian capital of Graz. Son of a local police chief he was raised in a strict environment of rules and according to him "the rod was not spared" when he disobeyed his parents. Early childhood friends remember him as 'cheerful, good-natured and exuberant'. He attend a Roman Catholic church every Sunday.

At age 14 he chose barbells over soccer and thus a career in body building began. He studied psychology at age 15 to develop his mind and its control over his body. While his father wanted a career for him in law enforcement and his mother favored a trade school, he spent much of teen years in Graz at the gymnasium or movie theatres. There he saw films with Johnny Weissmuller, Tarzan, and Steve Reeves, Hercules, and had an inclination of a career path from body building to acting. He remembers that the first film he saw with his father in a movie theatre starred John Wayne.

After a mandatory year's service in the Austrian Army, he pursued titles and awards in the body building world. Successive wins of Mr. Olympia and Mr. Universe titles lead him to Hollywood where he sought to use his physique in films much like Weismuller and Reeves. In 'Pumping Iron', his breakout film, Mr. Schwarzenegger displays a winning smile and tremendous mental and physical strength . With 'Conan the Destroyer' he found a role in which he could develop a character where his strong European accent wouldn't hinder him. The film's success opened the doors for a series of films. In 1984 he starred in the Terminator, a science fiction thriller and the name and role have stuck with him since. He followed up with a rapid succession of box offices successes including in each of the following years with Commando, Predator, the Running Man and Red Heat

Mr. Schwarzenegger began to alternate between comedies and action films starring in Twins and Total Recall, Kindergarten Cop and Terminator 2: Judgement day. He continued this formula through the next decade with a string of box office successes.

Mr. Schwarzenegger is a supporter of the Republican Party and successfully ran for the office of Governor of California in a recall election in 2003. Mr. Schwarzenegger has been an advocate of exercise for children and was chairman of the President's Council on Physical Fitness and Sports from 1990 to 1993. As governor he signed a bill creating the nation's first cap on greenhouse gas emissions. The law set new regulations on the amount of emissions utilities, refineries and manufacturing plants are allowed to release into the atmosphere. Schwarzenegger also signed a second global warming bill that prohibits large utilities and corporations in California from making long-term contracts with suppliers who do not meet the state's greenhouse gas emission standards.

He is married to TV journalist Maria Shriver and is the son-in-law to Eunice Kennedy Shriver. Together they have four children.

AWARD Recepient Pioneer in Technology

President and CEO of GE Health Care
Mr. Mark L. Vachon
Recipient of Pioneer in Technology Crystal Award

Mark L. Vachon is president and CEO of Global Diagnostic Imaging, a position he has held since January 2006.

Mr. Vachon began his GE career in 1982 as a member of the Financial Management Program in Schenectady, New York. After assignments at Corporate Research and Development, Large Motor and Generator, International Apparatus and Engineering Services, Mark joined the Corporate Audit Staff in 1985. Mr. Vachon served on the audit staff for five years, eventually becoming executive audit manager.

In 1990 he accepted the position of manager of International Finance at GE Appliances. Over the next several years, Mr. Vachon had assignments at Appliances as manager of the Process Improvement Group, general manager of Retail Sales and Market Development, and general manager of Consumer Satisfaction. In December 1995 he assumed the role of director of finance at GE Plastics Europe, based in Bergen op Zoom in the Netherlands. After a brief time as GE Plastic's Global Quality Leader, Mr. Vachon was promoted to vice president of Investor Relations with GE Corporate in April 1998. In July 1999 he was appointed a GE company officer, and in January 2002 he was appointed executive vice president and chief financial officer of NBC. The following year he was appointed to executive vice president and chief financial officer at GE Healthcare.

Mr. Vachon graduated from Northeastern University in Boston with a bachelor's degree in finance. He resides in the Waukesha, Wisconsin, area with his wife Karen and their two children.

Keynote Speaker

Ron von Jako, M.D.

BIOGRAPHY

Before joining GE Healthcare - Surgery in 2002, Dr. von Jako had been Senior Product and Clinical Development Director with Visualization Technology, Inc. While at VTI and in collaboration with GEHC, Dr. von Jako was responsible for creating the product development and evidence-based strategies for orthopedic and neurosurgical applications.

He launched the first commercial electromagnetic navigation platform integrated with GE C-arm fluoroscopy targeting spinal degenerative disc disease, trauma, and deformity procedures. Prior to VTI, Dr. von Jako was co-founder of Atls, Inc where he co-invented a patented electrosurgical device used for the excision and removal of various lesions through mini-open and laparoscopic procedures. Previous to this, Dr. von Jako served as VP of Clinical Affairs for Atlantis Surgical where he created novel fiberoptic and integrated endoscopic-retractor technologies. Here he directed clinical research teams supporting multinational surgical projects that resulted in new trends and standards that enabled some of the first least invasive concepts and access approaches for cardio-vascular, orthopedic and spinal fusions. Dr. von Jako has consulted for a number of different companies including SpineTech, Boston Scientific, US Surgical, Kaiser Aerospace, Medtronic and Smith and Nephew for minimally invasive approaches to surgery. His experience has included designing products and running trials for numerous surgical indications.

Currently heserves as Medical Director for GEHC Surgery/OEC providing medicalperspectives on risk assessments to further strengthen the focus on patient safety, drive benefits of surgical products thru evidencegeneration, and interacts between external experts and internal GEcross-functional areas to expand upon innovative technologies. Dr. Von Jako received his medical degree at 24 from the University of Pecs, School of Medicine and Health Sciences, Pecs Hungary and trained in surgery. He was awarded a Fellowship in Minimally Invasive Surgical Research from Dartmouth - Lahey Clinic Medical Center in Massachusetts.

He is currently a PhD Candidate in Experimental Surgery. Some professional affiliations and awards include the Mass Medical Society, Spine Arthroplasty Society, American Academy of Otorhinolarnygology- Head and Neck Surgery and American College of Surgeons Scientific Exhibition awards.

Friday August 30

8:00am - 5:55pm **Sponsor Exhibitions in CNSI Lobby**
Poster Sessions

Welcome and Introduction

8:00 - 8:20am

OFFICIAL WELCOME AND INTRODUCTION
By Chairmen:

Jean Jacques LEMAIRE and
Babak KATEB

8:20 - 8:55am

KEYNOTE SPEAKER
Ron VON JAKO, M.D.
Chief Medical Officer
Surgical Development Leader
GE Healthcare Surgery

Application of Electromagnetic Image Guidance in Spine Surgery

Scientific Session 11: Deep Brain Stimulation and Human Brain Machine Interface - Session 1

9:00 - 9:15am

CHAIR:
Michael S. OKUN, M.D.
Adelaide Lackner Associate Professor of Neurology
Co-Director Movement Disorders Center
Department of Neurology, McKnight Brain Institute
Medical Director National Parkinson Foundation

Sorting out Verbal Fluency/Cognitive Issues in Deep Brain Stimulation

9:15 - 9:30am

Cameron MCINTYRE, Ph.D.
Assistant Staff , Cleveland Clinic Foundation,
Department of Biomedical Engineering,
Assistant Professor,
Department of Molecular Medicine
Cleveland Clinic Lerner College of Medicine - CWRU

Deep Brain Stimulation Surgical Navigation Using Neurostimulation Models

9:30 - 9:45am

William SHAIN, Ph.D.
Research Scientist,
Wadsworth Center, Nervous System Disorders
Associate Professor,
School of Public Health,
Biomedical Sciences and Environmental Health Sciences

What Can We Learn from Pathology and Imaging Post-Mortem DBS Tissue

Scientific Session 11: **Deep Brain Stimulation and Human Brain Machine Interface - Session 1** *(Cont.)*

9:45 - 10:00am

CO-CHAIR:
Michele TAGLIATI, M.D.
Associate Professor of Neurology
Division Chief, Movement Disorders
Mount Sinai School of Medicine

The Safety of MRI in Deep Brain Stimulation: A Review of National Parkinson Foundation Centers of Excellence

10:00 - 10:15am

Felice SUN, Ph.D.
Clinical Scientist
NeuroPace

Responsive Neurostimulation for Epilepsy

10:15 - 10:30am — **Q & A**

10:30 - 11:00am — **COFFEE BREAK**

Scientific Session 12: **Robotics, Brain Implants and Human Brain Machine Interface - Session 2**

11:00 - 11:15am

CHAIR:
Geoffrey S. YOUNG M.D.
Director of MR Neuroimaging,
Brigham and Women's Hospital
Department of Radiology
Instructor in Radiology,
Harvard Medical School

Susceptibility Weighted Imaging Enhancement of Standard 3 Tesla T1-weighted SPGR Surgical Navigation Images for Improved Midbrain Nuclei Imaging and Guidance During Deep Brain Stimulation Implantation

11:15 - 11:30am

CO-CHAIR:
Mesut SAHIN, Ph.D.
Assistant Professor of Biomedical Engineering,
New Jersey Institute of Technology

Brain-Computer Interfacing: Too Many Choices of Brain Sites for Recording Volitional Activity

11:30 - 11:45am

Herc NEVES, Ph.D.
Principal Scientist, Biomedical Microsystems
Program Manager, Smart Implants
IMEC vzw

Cerebral Implants: A Microsystem Perspective

Scientific Session 12: **Robotics, Brain Implants and Human Brain Machine Interface - Session 2** *(Cont.)*

11:45 - 12:00pm

Aria A. TZIKA, Ph.D.
Director of NMR Surgical Laboratory,
Massachusetts General Hospital and Shriners Burns Institute,
Athinoula A. Martinos Center for Biomedical Imaging
Harvard Medical School

Connectivity Alterations Assessed by Combining fMRI and MR Compatible Rehabilitation Robots in Chronic Stroke

12:00 - 12:15pm

Wentai Liu, Ph.D.
Professor of Electrical Engineering
Campus Director of NSF-ERC on Biomimetic MicroElectronic Systems (BMES)
University of California at Santa Cruz

High Density Brain Signal Recording and Processing Miniaturized System

12:15 - 2:00pm **LUNCH BREAK**

Scientific Session 13: **Mapping for Energy Delivery in the Brain**

2:00 - 2:15pm

CHAIR:
Antonio A.F. DE SALLES, M.D., Ph.D.
Professor of Neurosurgery,
Head of Stereotactic Radiosurgey
David Geffen-UCLA School of Medicine

Importance of Fibertracking Maps for Functional Neurosurgery

2:15 - 2:30pm

CO-CHAIR:
Alessandra GORGULHO, M.D.
Stereotactic Section
Department of Neurosurgery
David Geffen-UCLA School of Medicine

DTI and Imaging Fusion for AVM Radiosurgery Planning and Follow-up

2:30 - 2:45pm

Tom S. LEE, M.S.
Computer Scientist, Permedics Inc.
Research Assistant, Loma Linda University

Software-Based MRI Distortion Correction for Precise Radiation Treatment Planning

2:45 - 3:00pm

Nzhde AGAZARYAN, Ph.D., DABR
Associate Professor of Radiation Oncology
Stereotactic Section
Department of Neurosurgery
David Geffen-UCLA School of Medicine

Frameless Localization for Radiosurgery Delivery

Scientific Session 13: **Mapping for Energy Delivery in the Brain** *(Cont.)*

3:00 - 3:15pm

Justin Zivin, M.D., Ph.D.
Professor of Neurosciences and
Vice Chairman of the Department of Neurosciences,
University of California San Diego School of Medicine

Use of Laser Irradiation of the Brain for Improving Recovery from Stroke

3:15 - 3:30pm — **Q & A**

3:30 - 4:00pm — **TEA RECESS**

Scientific Session 14: **New Horizon**

4:00 - 4:15pm

CHAIR:
Tzyy-PING JUNG, Ph.D.
Associate Director
Swartz Center for Computational Neuroscience
University of California San Diego

Complex Brain Dynamics during Sustained Attention Tasks

4:15 - 4:30pm

CO-CHAIR:
Kenneth I. LIPOW, M.D.
Chief of Neurosurgery,
Bridgeport Hospital
(a Yale Network Affiliate)
President of Connecticut Neurosurgical Specialists, P.C.

The Challenge of Neurosurgical Physiologic Augmentation

4:30 - 4:45pm

Arminas RAGAUSKAS, D.Sc.
Professor
Head of Telematics Sc. Lab.,
Kaunas University of Technology, Lithuania

Innovative Technologies for Noninvasive Assessment of Intracraniospinal Physiological Characteristics

4:45 - 5:00pm

Jeng-Ren DUANN, Ph.D.
Project Scientist
Swartz Center for Computational Neuroscience,
Institute for Neural Computation
University of California San Diego

Exploring BOLD Based-Causality between Independent Brain Networks

5:00 - 5:15pm

Srini MUKUNDAN, PhD, MD
Director of Neuroradiology
Brigham and Women's Hospital

CT Based Surgical Planning in the Cases of Craniosynostosis

5:15pm — **TEA RECESS**

Special Thanks

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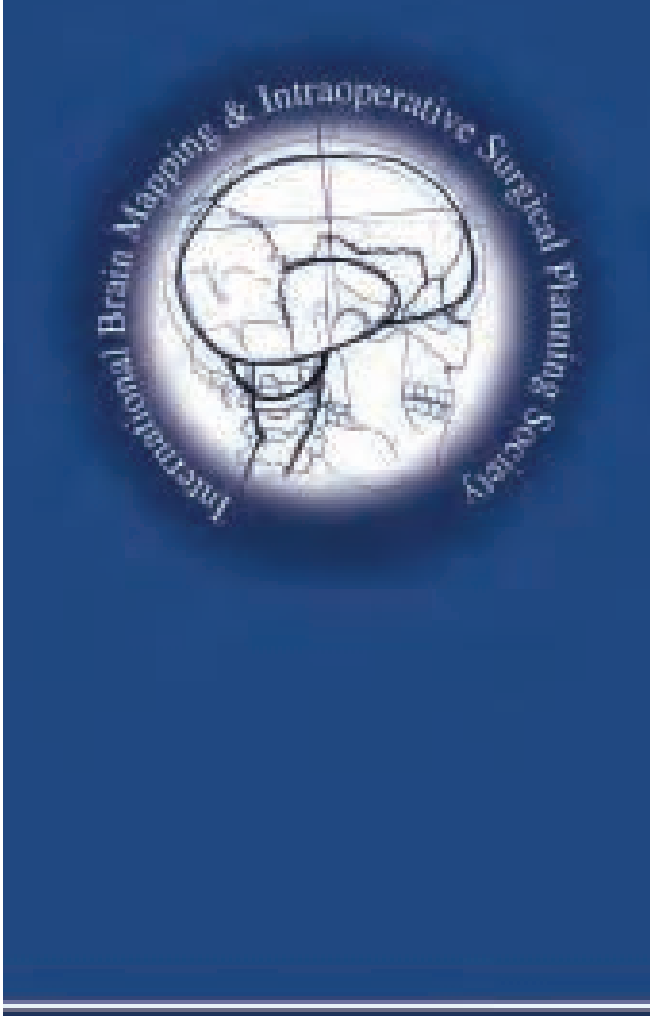


Info:

IBMISPS Global Headquarters
8159 Santa Monica Blvd., Suite 200
West Hollywood, CA 90046
Tel: 310.500.6196 - Fax: 323.654.3511
contact@ibmisps.org
ibmisps.org

AVILABLE ABSTRACTS:

Glioblastoma and Vessel Shape as monitored by Magnetic Resonance Angiography (MRA): Case Report of a Patient Followed Serially for Four Years

Elizabeth Bullitt
CASILab, Department of Surgery, University of North Carolina, Chapel Hill NC 27599
Contact: Elizabeth Bullitt, CASILab, CB# 7062, University of North Carolina, Chapel Hill NC, 27599.
bullitt@med.unc.edu

There is currently no reliable, noninvasive method of assessing brain tumor treatment response. Tumors induce abnormal vessel tortuosity quantifiable from vessels segmented from MRA. We describe a patient with glioblastoma imaged serially by MRA. His course included radiation and chemotherapy, remission, tumor recurrence at a new site, resection of the new lesion, occipital lobe stroke, treatment with anti-Vascular Endothelial Growth Factor (anti-VEGF) therapy, and death 4.5 years from the time of diagnosis.

Analysis methods included segmentation of vessels from 14 sequential MRAs of this tumor patient and of 50 healthy controls. Three regions of interest were examined: the initial tumor (prospectively), the second tumor (both retrospectively and prospectively), and the entire brain (prospectively). Vessel shape measures (vessel number, vessel radius, and tortuosity) were compared to the values obtained from healthy controls over the same three regions.

Results suggest that vessel tortuosity abnormalities resolve during successful therapy even when not specifically anti-angiogenic, that tumor resurgence is heralded by the development of focal vessel shape abnormalities months before gadolinium enhancement is visible by MR, that total gross resection of an active focus is associated with an abrupt but transient drop in vessel shape abnormalities both focally and globally, and that anti-VEGF therapy does not necessarily induce rapid normalization of vessel shape. We believe that quantitative, statistical measures of vessel shape could provide an important tool both for the therapeutic monitoring of individual patients and for improving understanding of how cancers respond or fail to respond to various treatment modalities.

Supported by R01 EB000219 NIH-NIBIB

Keywords: vascular imaging, tumor, MRA, glioma, brain

Connectivity alterations assessed by combining fMRI and MR compatible rehabilitation robots in chronic stroke

Dionyssios Mintzopoulos[1,2], Loukas G. Astrakas[1,2], Azadeh Khanicheh[3], Angelos A. Konstas[4], Michael A. Moskowitz[2], Bruce Rosen[2] and A. Aria Tzika[1,2]
[1]NMR Surgical Laboratory, Shriner's Burn Institute, [2]Athinoula A. Martinos Center for Biomedical Imaging, [3]Dept. of Mechanical Engineering, Northeastern Universirty, [4] Department of Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, MA 02114, USA

Purpose
Our aim was to investigate functional reorganization of motor systems by probing connectivity between motor related areas in chronic stroke patients with functional magnetic resonance imaging (fMRI) combined with a novel MR-compatible hand-induced robotic device (MR_CHIROD).

Methods
Six healthy male volunteers and five male patients with subcortical strokes underwent MR evaluation before and following an 8-week home training consisting of ball-squeezing training at 75% of maximum strength for 1 hour/day, 3 days/week. Subjects underwent fMRI in a 3-T TimTrio MR scanner while performing a motor task with MR_CHIROD. Changes of cortical connectivity in the M1 motor area, the supplementary motor area (SMA) and cerebellum were assessed using dynamic causal modeling (DCM). SMA was the motor input region.

Results
The motor input to the SMA was increased in stroke patients after training. The intrinsic neural coupling between M1 and SMA was also significantly increased after training suggesting the induction of SMA recruitment. SMA coupling to cerebellum and, to a lesser extent, M1 coupling to cerebellum were significantly enhanced after training.

Conclusions
The results demonstrate that rehabilitation training enhances the connectivity between motor areas in chronic stroke patients that may help counterbalance a functionally abnormal M1 in stroke patients. The altered connectivity may underlie the hand motor recovery following rehabilitation in chronic stroke patients. Assessing changes in connectivity using DCM by means of fMRI and MR_CHIROD might be used in the future to further elucidate the neural network plasticity that underlies function recovery in chronic stroke patients.

Deep brain stimulation surgical navigation using neurostimulation models.

Cameron C. McIntyre, Ph.D.
Cleveland Clinic Foundation
Department of Biomedical Engineering

Abstract: Deep brain stimulation (DBS) is an effective clinical treatment for several medically refractory neurological disorders. The clinical outcomes of DBS are a testament to the efficacy of the current device technology, surgical implantation techniques, and clinical programming strategies. However, DBS also requires highly trained and experienced clinical oversight to achieve maximal therapeutic benefit in each patient. In turn, a necessary step forward for wider scale use of this medical technology is the development of assistive technologies that help to optimize clinical implementation of DBS. Therefore, our laboratory has worked to develop anatomically and electrically accurate computer models of DBS that can be customized to individual patients. These patient-specific models are constructed with our academic research software tool Cicerone. Cicerone enables interactive 3D visualization of co-registered magnetic resonance images (MRI), computed tomography (CT) scans, 3D brain atlases, neurophysiological microelectrode recording (MER) data, and deep brain stimulation (DBS) electrode(s) with the volume of tissue activated (VTA) as a function of the stimulation parameters. The software can be used in pre-operative planning to help select the initial surgical trajectory to the intended anatomical target. Intra-operatively, Cicerone allows entry of the stereotactic microdrive coordinates and MER data, enabling real-time interactive visualization of the electrode location in 3D relative to the surrounding neuroanatomy and neurophsyiology. In addition, the software provides predictions of the VTA generated by DBS and calculates its overlap with surrounding anatomical structures. In turn, the neurosurgeon can use the combination of anatomical (MRI / CT / 3D brain atlas), neurophysiological (MER), and electrical (DBS VTA) data to optimize the placement of the DBS electrode prior to permanent implantation.

High-field and low-field magnetic resonance Image guided systems: Impact of Image Cycle Time in Minimal Access Nerve Surgery and Interventional MRI

By Aaron Filer

Objective - Develop and assess the utility of novel minimal access techniques including percutaneous open configuration interventional MRI (iMR), open surgery using open or closed/cylindrical interventional MR systems, and minimal access open surgery in a standard operating room.

Technique/Method – For over 2,500 percutaneous Open iMR procedures, 25 incisional surgery open iMR cases, three incisional surgery closed/cylindrical iMR cases, 25 CT guided percutaneous procedures, and over 1,000 minimal access incisional surgery cases in the standard operating room with electrodiagnostic monitoring, cycle time for intraoperative data collection was assessed.

Results – Cycle time varied greatly. The minimum was for open surgery in the standard operating room with direct nerve stimulation for EMG requiring ten to fifteen seconds which was applicable for dozens of assessments during the surgery and negligible effects on total surgical time. Percutaneous procedures in the Open iMR environment allowed for twenty or thirty imaging events during a procedure with cycle time averaging 20 seconds. Incisional surgery in the Open iMR system had cycle time of about 1 minute for 'in-magnet' procedures and about five minutes for 'magnet-adjacent' procedures. Incisional surgery in closed/cylindrical iMR image cycle time was about one hour and it was difficult to obtain guidance from the findings – the cylindrical imager greatly extended surgical time.

Conclusions – Percutaneous Open configuration iMR provides clear benefits over CT or ultrasound. Minimal access surgery, and incisional Open configuration iMR are useful and effective. Closed/cylindrical iMR systems degrade patient safety, add excessively to surgical time and provided few useful intra-operative benefits.

Running Title: Minimal Access Surgery and iMR
Key words: Thoracic Outlet, minimal access surgery, Open MR, Nerve, Piriformis, Interventional MR

Neuroscience discovery with grid computing

Johan Montagnat
CNRS researcher (I3S laboratory)

Abstract:
Grid infrastructures, composed of distributed computing unit and storage resources at the scale of the Internet, have become a key component to support scientific discoveries in many disciplines. The European EGEE project for instance operates a world-wide infrastructure providing a total of more than 80,000 CPU cores spread over more than 240 computing centers in use by 8,000 scientists over the world.

On top of such a generic grid infrastructure, the NeuroLOG project aims at designing and integrating a grid middleware to fulfill the needs of neuroscientists, especially considering three pathologies: strokes, multiple sclerosis and brain tumors. This work describes the software architecture that was designed for (i) managing and sharing sensitive medical data sets over a large scale distributed storage infrastructure; and (ii) enabling the description and execution of image processing pipelines on a remote grid infrastructure. The middleware design adopts a user-centric perspective to meet the neuroscientists expectations. The project's design study and methodology were proposed to achieve the integration of heterogeneous site data schemas and the definition of a site-centric policy. The NeuroLOG middleware will bridge HealthGrid and local resources to match user desires to control their resources and provide a transitional model towards HealthGrids.

A new concept of invasive multi-robot system for Neurosurgery

Matthieu ALRIC[1], Carole MARTIN[1], Fabien TIXIER[2], Frédéric CHAPELLE[1], Grigore GOGU[1], Rémy MALGOUYRES[2], Jean-Jacques LEMAIRE[3]

(1) : Univ Clermont 2, Laboratoire de Mécanique et Ingénieries (LaMI), Institut Français de Mécanique Avancée (IFMA), Les Cézeaux, BP265, 63175 Aubière cedex, France
Phone: 33(0)473288006 / Fax: 33(0)473288027
E-mail: {matthieu.alric, carole.martin, frederic.chapelle, grigore.gogu}@ifma.fr

(2) : Univ Clermont 1, Laboratoire d'Algorithmique et Image de Clermont (LAIC), IUT département informatique, Les Cézeaux, B.P. 86, 63172 Aubière cedex, France
Phone: 33(0)473177109 / Fax: 33(0)473177125
E-mail: {tixier, remy.malgouyres}@laic.u-clermont1.fr

(3) : Univ Clermont 1, CHU Clermont-Ferrand, Hôpital Gabriel Montpied, Service de Neurochirurgie A, Clermont-Ferrand, F-63003, France ;
Equipe de Recherche en Signal et Imagerie Médicale (ERIM), EA3295, Clermont-Ferrand, F-63001, France
Phone: 33(4)73752163 / Fax: 33(0)473752186
E-mail: jjlemaire@chu-clermontferrand.fr

Presentation preference: *Oral Presentation*
Section preference: *Image guided systems*

Abstract (244 Words): Neurosurgery was one of the very first surgical applications to attract the development of robotics. Most of the current progress in medical imaging, image guidance, brain mapping, mechanical design, simulation and haptic feedback, have fostered the design of robots which might offer greater precision and more reliability for complex surgical manoeuvres. The paper deals with a new concept of multi-robot system for neurosurgical applications. It integrates five subsystems: (1) stereo-simulator for preoperative planning, (2) carrying robot, (3) skull-opening robot, (4) deployment robot and (5) ablation robot. The design of the overall system is conducted in close collaboration between engineers and physicians. Only subsystems (1), (4) and (5) are discussed here.

Stereo-simulator provides 3D stereoscopic visualization (without glasses) with an interface to simulate the deployment of the robot along a defined trajectory avoiding critical brain areas. Stereoscopy is used in order to enhance surgeon's 3D perception of depth and anatomic relationships. Magnetic Resonance Imaging - defined critical constraints are included to prevent dangerous trajectories. The deployment robot gives the resection robot an access to tumours embedded in the brain. The simulation of the brain is displayed with a simplified deformation model (finite elements). The robotic concept of the deployment robot is chosen after an evaluation of relevant existing systems, according to the deployment task requirements (kinematic model introducing deployment strategies). The resection robot aims to strict intra tumor debulking. The task modelling integrates relevant constraints such as adaptability to various brain tumours and tool accessibility.

Keywords: ***Robotics, Neurosurgery, Image-Guided Neuroprocedure.***

Differential Effects of Anticonvulsant Mechanism of Action on Language Organization Revealed by Magnetic Auditory Evoked Fields

Chang Li[a,c], Warren S. Merrifield[a] , William W. Sutherling[a,b]
[a] Huntington Medical Research Institutes, Pasadena, California; [b] Epilepsy and Brain Mapping Program, Pasadena, California; [c] Case Western Reserve University, Cleveland, Ohio

Chang Li

MEG Lab
Huntington Research Institute
10 Pico Street
Pasadena, CA 91105
Ph: (626) 796-7874
Fax: (626) 792-7336
Email: chang.li@case.edu

Warren S. Merrifield, Ph.D
MEG Lab
Huntington Research Institute
10 Pico Street
Pasadena, CA 91105
Ph: (626) 796-7874
Fax: (626) 792-7336
Email: merrifield@hmri.org

William W. Sutherling, M.D.
Medical Director
Epilepsy and Brain Mapping Program
10 Congress Street, Suite 505
Pasadena, CA 91105
Ph: (626) 792-7300
Fax: (626) 792-7336
Email: Sutherling@msn.com

The effects of antiepileptic drugs (AED) on the Auditory Evoked Field (AEF) were analyzed using magnetoencephalography (MEG). Data was collected in a perspective, blind fashion in 57 patients and then analyzed using objective standard dipole analysis. The AEDs were grouped by mechanism of action (MOA): calcium channel, sodium channel, GABA, and SV2A. General linear model MANOVA was used to examine several different MEG parameters including latency, location, and amplitude. There was a moderate effect size when analyzing the main effect for latency. Post-hocs for the latency main effect indicated a difference for several different drug combinations. The 2-way interaction between handedness and type of antiepileptic drug also yielded a moderate effect size. Post-hocs indicated a statistically significant difference

in AEF peak latency for calcium channel (p=0.049) and a close to significant result for sodium channel (p= 0.074).The AEF peaks for calcium channel drugs were longer for right handed patients. In sodium channel drugs, the AEF peaks were shorter for right handed patients. These results demonstrate how the mechanism of action (MOA) may be different when antiepileptic drugs are used in combination. There also may be data to suggest that language organization interacts with antiepileptic drugs because handedness has been shown to be a statistically reliable predictor of how the brain organizes language function.

Keywords: MEG, AEF, mechanism of action, language organization, MANOVA

Safety of MRI in Patients with Implanted Deep Brain Stimulation Devices

Michele Tagliati, MD,1 Joseph Jankovic, MD,2 Fernando Pagan, MD,3 and Michael S. Okun, MD,4
for the National Parkinson Foundation DBS Working Group

1. Department of Neurology, Mount Sinai School of Medicine, New York, NY
2. Department of Neurology, Baylor College of Medicine, Houston, TX
3. Department of Neurology, Georgetown University Hospital, Washington, DC
4. Department of Neurology, University of Florida, Gainesville, FL

Abstract
Objective: To survey safety of MRI in PD patients implanted with DBS devices. Background: MRI in patients with DBS implants is useful to confirm DBS electrode placement, to optimize programming and investigating complications. However, several medical centers do not perform MRI studies in DBS patients because of safety concerns. The safety profile of MRI in DBS patients has not been well documented in large clinical series. Methods: 42 NPF Centers of Excellence (COEs) were asked to complete a questionnaire on MRI use and DBS. Results: Investigators from 40 of 42 (95%) NPF COEs completed the survey and 23 (58%) reported that they were currently performing brain MRI in DBS patients, while 3 (7.5%) had done it in the past. The 17 COEs currently not performing post-operative MRI for DBS listed the following reasons: 1) Industry guidelines and/or warnings (53%); 2) Defer clinical decision to outside department (29%); 3) Liability/risk/safety (18%); 4) No active DBS program (18%); 5) No available MRI (12%); 6) Insurance and reimbursement concerns (6%). A total of 3,304 PD patients with one or more DBS leads had a brain MRI scan, and 177 DBS patients had MRI of other body regions. In one case MRI was associated with an IPG failure without neurological sequelae after IPG replacement. No other complications were reported. Conclusions: These data provide evidence for a favorable risk/benefit ratio for brain MRI in patients with DBS implants. We suggest that the current safety guidelines be re-examined given this large and positive experience.

Mapping neocortical seizure origin by means of an adaptive directed transfer function.

Wilke C1*, van Drongelen W2,3, Kohrman M2,3, He B1
1. Biomedical Engineering, University of Minnesota, Minneapolis, MN, USA
2. Pediatrics, University of Chicago, Chicago, IL, USA
3. Neurology, University of Chicago, Chicago, IL, USA
* correspondences to wilk0242@umn.edu

Abstract:
It has been estimated that there are currently over half a million Americans living with epilepsy which is refractory to medical treatment. In this group of patients, surgical removal of the offending cortical areas may be the only viable means by which to reduce or eliminate the seizure activity. Optimal surgical treatment for patients with neocortical-onset seizures poses a significant challenge due to the rapid propagation of ictal activity from the seizure onset zone (SOZ) to the surrounding cortical areas.

This leads to considerable difficulty in the precise identification of the location of the SOZ. Recently, we have developed a time-varying measure of Granger causality, termed the Adaptive Directed Transfer Function (ADTF), as a means to detect the origin of ictal activity in these patients.

We have investigated the ability of the ADTF to locate the SOZ from recordings of interictal spikes and short epileptiform discharges in electrocorticogram recordings from four pediatric patients with extra-temporal lobe neocortical-onset seizures. In each patient, the ADTF identified cortical regions as 'sources' of the epileptiform activity which were well-correlated with the SOZ demarcated by the neurologists. Additionally, removal of the ADTF-identified sources was correlated with a significant reduction in the number of seizures.
In summary, we have found the ADTF to successfully locate the cortical sources of ictal activity as compared with clinical findings and post-operative surgical assessment. Based upon these results, this technique merits further investigation and may additionally prove a useful tool for other brain mapping applications.
Key Words: epilepsy, surgical planning, brain mapping, adaptive DTF, connectivity

Advanced Approaches for Pre-operative Language Mapping

Yanmei Tie, Ralph Suarez, Lauren O'Donnell, Isaiah Norton, Alexandra J. Golby
Brigham and Women's Hospital
Harvard Medical School
Boston, MA

The goals of pre-operative language mapping for neurosurgery are to define the critical language areas for a specific patient. Activation techniques such as fMRI have the advantage of being non-invasive, but cannot distinguish essential from participating brain areas. Thus, fMRI tends to be quite sensitive but not specific for determining essential language areas. We have studied 142 neurosurgical patients with fMRI, investigating approaches to maximizing the utility of pre-operative language mapping including optimization of: task selection, behavioral paradigm design, analytic approaches, and combining information from multiple modalities. We have found that complex language tasks activate more language areas. Examining fMRI with independent component analysis approaches, particularly combining information from different tasks yields activations which are more selective for the putative language areas. Examining all activated voxels, rather than those above an arbitrary threshold, yields laterality estimates which are less ambiguous. Combining information from fMRI study in healthy subjects and patients with intra-operative findings has provided a powerful method for the development and validation of these strategies. Nevertheless, complete pre-operative language mapping using fMRI remains challenging, and there remains an important role for intra-operative mapping in the awake patient.

Prefrontal cortex involvement as adverse effects of harsh corporal punishment in childhood on brain gray matter volume

Akemi Tomoda, MD1,2,3, Hanako Suzuki, MA2,3, Keren Rabi, MA,2, Yi-Shin Sheu, BS2, Ann Polcari, PhD2, and Martin H. Teicher, MD1,2

1 Department of Psychiatry, Harvard Medical School, Boston, MA, USA, 2 Developmental Biopsychiatry Research Program, McLean Hospital, Belmont, MA, U.S.A. and 3 Child Developmental Sociology, Faculty of Medical and Pharmaceutical Sciences Kumamoto University, Kumamoto, Japan

Background: A history of exposure to harsh physical discipline has been reported to be associated with negative outcomes, ranging from conduct disorder to depression. Little is specifically known about the effects of parental harsh corporal punishment (CP) in childhood on gray matter volume (GMV), and an objective overall assessment using voxel-based morphometry (VBM) has yet to be reported. The aim of this study was to ascertain whether CP was associated with discernible effects on brain morphology.
Methods: We conducted optimized VBM in 23 (15 males and 8 females) unmedicated, right-handed subjects (18-25 years) with a history of exposure to parental CP, and 22 psychiatrically healthy controls matched for age, gender, SES, and parental education. Selected subjects were recruited from the community by advertisements. We used a high-resolution T1-weighted MRI data set and subjects were imaged volumetrically at 3 T.

Results: We observed the most significant reduction in GMV in the right medial frontal gyrus (medial prefrontal cortex) in individuals exposed to CP ($P = 0.037$, corrected cluster level). In comparison with healthy controls, there was an average of 19.1% GMV reduction in the CP subjects. Also, there were significant reductions in GMV in the left medial frontal gyrus (–14.5%) and in the right anterior cingulate gyrus (–16.9%) in individuals exposed to CP.
Conclusions: Exposure to CP degrades prefrontal cortical development. These findings point to the possibility that harsh CP may have potential detrimental effects on their brain morphology. We need to find better ways to discipline children.

Implementation and Preliminary Clinical Experience with the Use of Ceiling Mounted Mobile High Field Intraoperative Magnetic Resonance Imaging .

Authors :
Dr Michael R Chicoine , MD - Principle Author
Associate Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110
Phone : 314-362-4313
Fax : 314- 362- 2107
chicoinem@nsurg.wustl.edu

Dr Amit Singla , MD
Research assistant
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110
Phone : 314-495-9465
Fax : 314- 362- 2107
drasingla@yahoo.co.in

Dr Ralph G Dacey ,Jr., MD
Professor and Chairman
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110
Phone : 314-362-3571
Fax : 314- 362- 2107
schillizzij@wustl.edu

Dr Gregory J Zipfel , MD
Assistant Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057

660 S. Euclid Ave.
St. Louis, MO 63110Phone : 314-747-8871
Fax : 314- 362- 2107
zipfelg@nsurg.wustl.edu

Dr Keith Rich , MD
Associate Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110Phone : 314-747-8871
Fax : 314- 362- 2107
richk@nsurg.wustl.edu

Dr Joshua L Dowling , MD
Associate Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110Phone : 314-362-3457
Fax : 314- 362- 2107
dowlingj@nsurg.wustl.edu

Dr Jeffery R Leonard , MD
Assistant Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110Phone : 314-454-2812
Fax : 314- 362- 2107
leonardj@nsurg.wustl.edu

Dr Matthew D Smyth , MD
Assistant Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110

Phone : 314- 454-4454
Fax : 314- 362- 2107
dobbs@nsurg.wustl.edu

Dr Paul Santiago , MD
Assistant Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110
Phone : 314-362-3580
Fax : 314- 362- 2107
santiagop@nsurg.wustl.edu

Dr Eric C Leuthardt, MD
Assistant Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110
Phone : 314-362-8012
Fax : 314- 362- 2107
leuthardte@wustl.edu

Dr David D Limbrick, M.D., PhD.
Assistant Professor
Department of Neurosurgery
Washington University
School of Medicine
Campus Box 8057
660 S. Euclid Ave.
St. Louis, MO 63110
Phone : 314-454-2810
Fax : 314- 362- 2107
limbrickd@wustl.edu

Presentation preference:
Oral presentation

Section Preference :
Intraoperative surgical planning

Abstract
Objective: Studies suggest that intraoperative magnetic resonance imaging (iMRI) can improve the accuracy of neurosurgical procedures. Implementation of iMRI into the operating room is a complex and costly process. We describe our experience with integration of an IMRIS movable ceiling mounted high field (1.5 T) iMRI in our operating rooms and our preliminary clinical results using this device.

Methods: Financial, architectural, engineering, and marketing aspects of implementation of our iMRI and our initial 3 months clinical experience in 46 patients were reviewed.
Results: Through collaborations between Barnes-Jewish Hospital, St. Louis Children's Hospital, Washington University, and the IMRIS Corporation, efficient integration of a ceiling mounted movable iMRI between 2 fully equipped neurosurgical operating rooms has been accomplished. An initial clinical experience with 46 cases (ages 7-77, M: F 23:23) demonstrates that movable high-field iMRI can be effectively and simultaneously used between two operating rooms to provide real-time imaging to improve neurosurgical procedures. Cases included 40 tumor resections (20 gliomas, 14 pituitary adenomas, 2 craniopharyngiomas, 2 meningiomas, and 2 metastases), 2 Chiari I decompressions, 2 catheter placements, and 2 resections for epilepsy. The extent of tumor resection was improved in 14/26 (53%) cases of incomplete resections.

Conclusion: A movable high field iMRI can be successfully integrated into a large academic neurosurgical practice and provides real time imaging to improve neurosurgical procedures. Long term follow up is needed to evaluate the clinical and financial benefits of this technology in the field of neurosurgery.

Key words :
Neurosurgery , High field , iMRI
Title: (IBMISPS 2008 at UCLA)

Measuring White Matter Degeneration with Diffusion Tensor Imaging and Multimodal Analysis

Wang Zhan, Ph.D., Norbert Schuff, Ph.D., Mickael Weiner, M.D.

Abstract:

Degeneration of white matter plays a significant role in the biological and pathological process of aging and the neuronal degenerative diseases. Diffusion tensor imaging (DTI) provides unique tools for accessing the white matter integrity and connectivity in a full noninvasive manner. Furthermore, a combination of DTI and other MRI modalities such as T1 and T2 weighted images are able to offer extra power of characterization on the nature of neuronal degeneration. We aim to develop joint multimodal analysis methods to effectively capture the white matter alterations.

Keywords: Diffusion, MRI, Multimodal Analysis, White Matter Degeneration

Metabolic dysfunction and circadian rhythm abnormalities in children and adolescents with sleep disturbance

Akemi Tomoda, MD*, Junko Kawatani, MD*, Takako Joudoi , MD**,
Akinobu Hamada, PhD***, Teruhisa Miike, MD**

Department of Child Developmental Sociology* and Department of Child Development**, and Department of Pharmacy***,
Faculty of Medical and Pharmaceutical Sciences
Kumamoto University, Kumamoto, Japan

Correspondence address: Akemi Tomoda, MD, PhD
Department of Child Developmental Sociology, Faculty of Medical and Pharmaceutical Sciences, Kumamoto University
1-1-1 Honjo, Kumamoto 860-8566, Japan

E-mail: tomo@kumamoto-u.ac.jp

* Akemi Tomoda and Junko Kawatani contributed equally as first authors.

Abstract

Objective: Sleep disturbance due to circadian rhythm abnormalities occurring in previously healthy children and adolescents is a vexing problem encountered by pediatric practitioners. They often complain of gastrointestinal discomfort after meals. We investigated the metabolic function in pediatric patients with circadian rhythm sleep disturbance. Methods: We assessed carbohydrate metabolism, autonomic function, and human clock genes in whole blood cells in 18 unmedicated patients (7 boys and 11 girls), aged 12-17 years with circadian rhythm sleep disorder. **Results:** Based on the self-recorded sleep-wake logs, all 18 subjects were diagnosed as having one of the four sleep

disturbances, i.e., ten were DSPS, five non-24, one irregular, and two long sleeper. In the healthy subjects, the mRNA level of *hPer2* was previously reported to be significantly elevated at 6:00 while only three among the patients showed the mRNA level of *hPer2* at 6:00. Compared to the normal control data, sigma IRI of the patients was significantly lower (patients vs controls = 11971.7 ± 6107.5 vs 13360.2 ± 9091.1 μU/ml, $P < 0.001$). Moreover, the insulin glucose ratio, initial insulin response 30 min after glucose ingestion, was statistically different from that of the normal controls data (patients vs controls = 0.19 ± 1.06 vs 0.70 ± 0.42, $P < 0.001$). Conclusions: We found metabolic and chronological dysfunction in children and adolescents with sleep disturbance. Furthermore, this study revealed that they have decreased carbohydrate tolerance and a lack of human clock gene regulation in whole blood cells. Hence, we would like to emphasize the importance of early diagnosis and the prevention of circadian rhythm sleep disorders in pediatric cases.

Measuring White Matter Degeneration with Diffusion Tensor Imaging and Multimodal Analysis

Wang Zhan, Ph.D.

Norbert Schuff, Ph.D. and Michael Weiner, M.D.

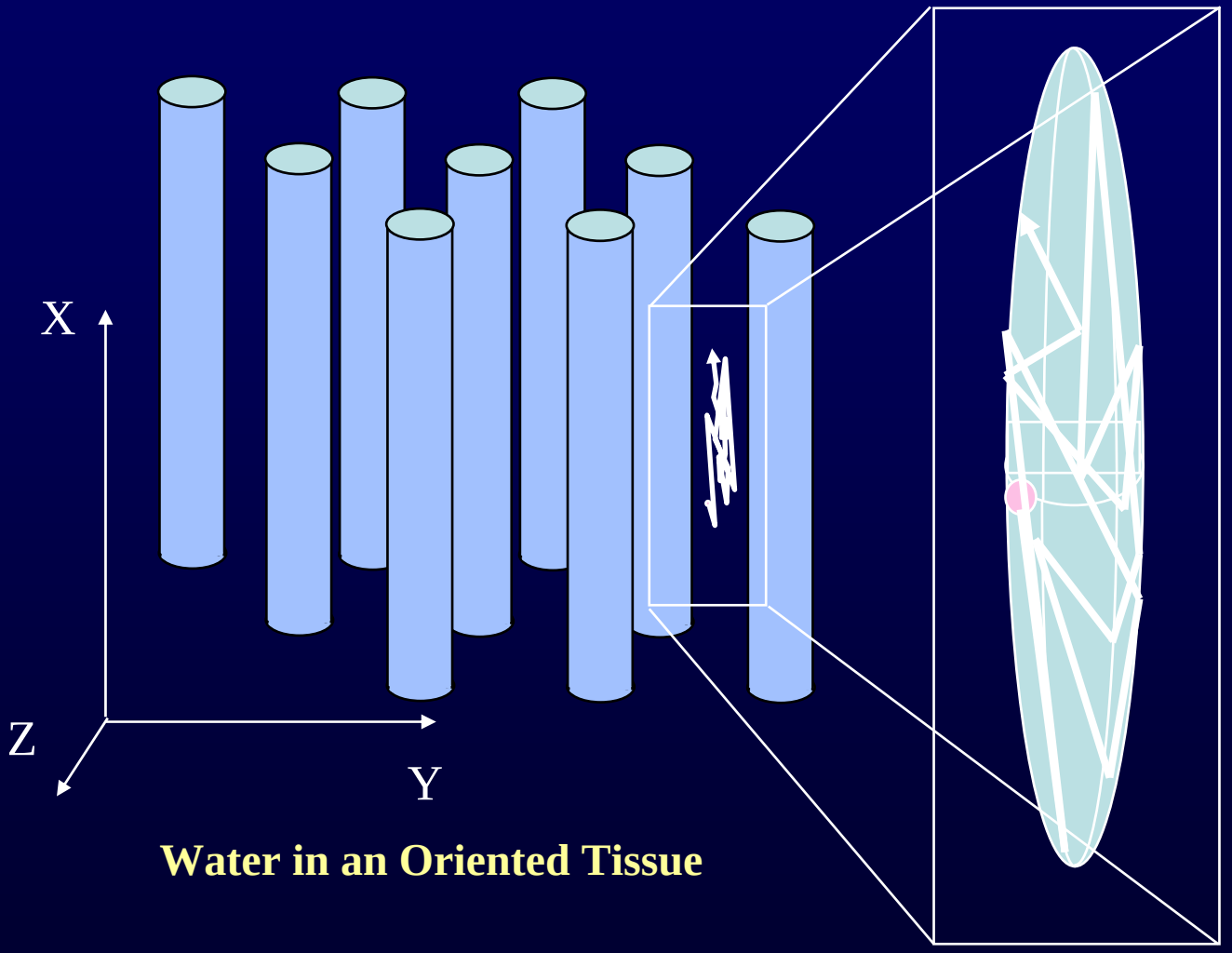
Center for Imaging of Neurodegenerative Diseases, DVA Medical Center, University of California, San Francisco, CA 94121

Wang.Zhan@ucsf.edu

Contents

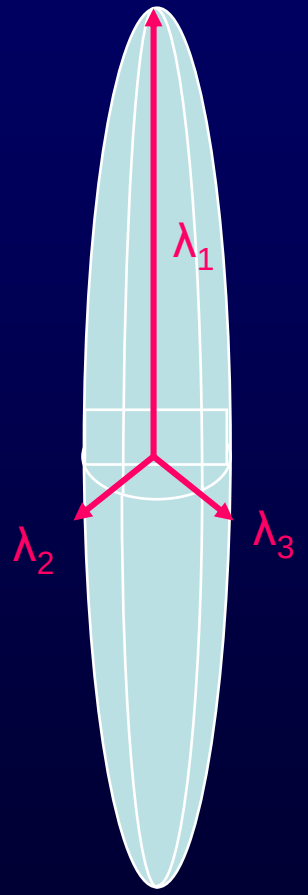
- Voxel-wise diffusion tensor imaging (DTI) analysis at group level.
- Comparing WM alterations associated with aging, ApoE-4, and AD.
- Correlation analysis between different MRI modalities.
- Two-compartment model for WM degeneration.

Water Diffusion in White Matter



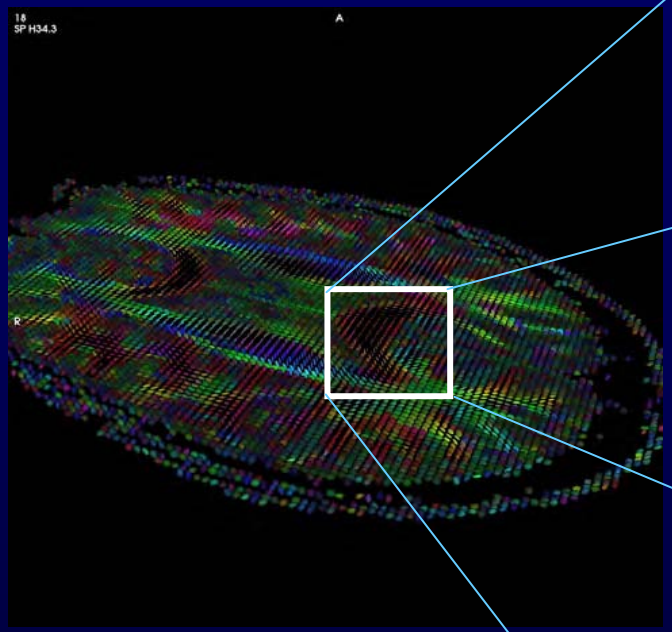
Water in an Oriented Tissue

Water Motion

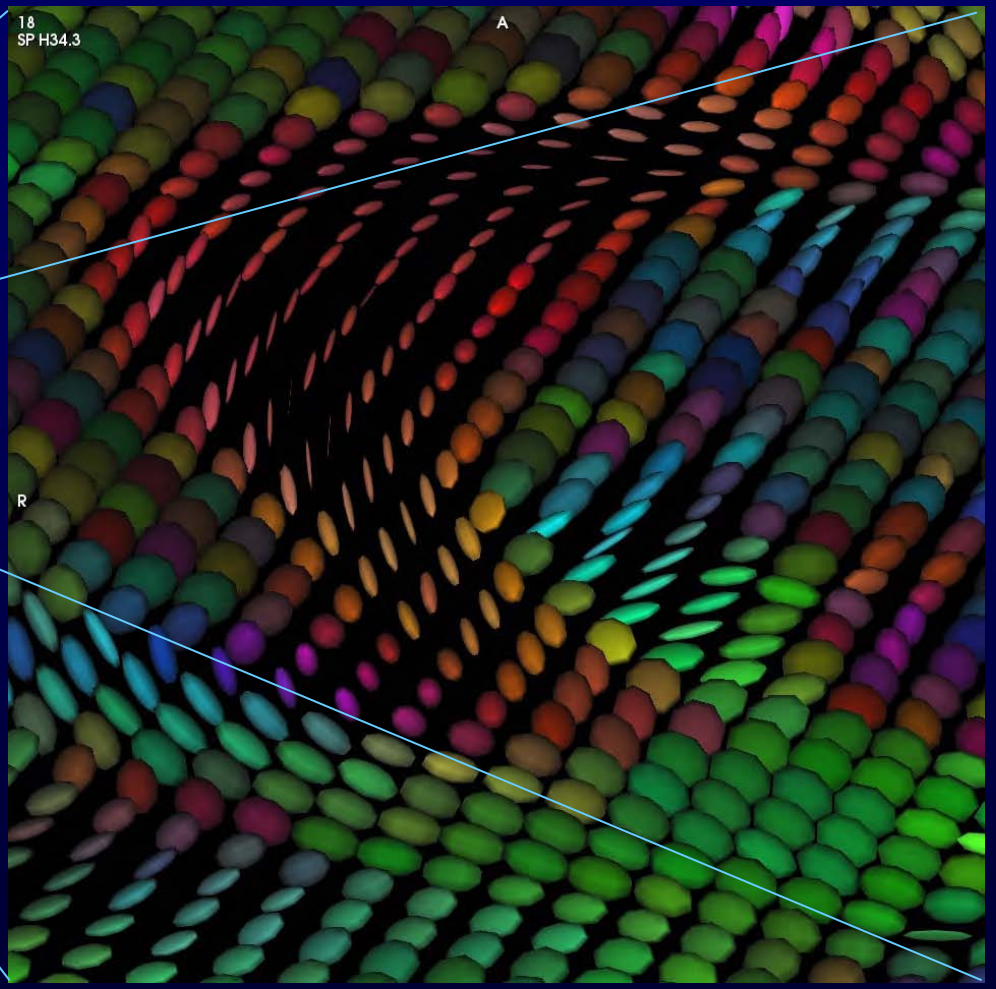


Diffusion 'Ellipse'

Field of Diffusion Tensor Ellipsoids



Whole Slice

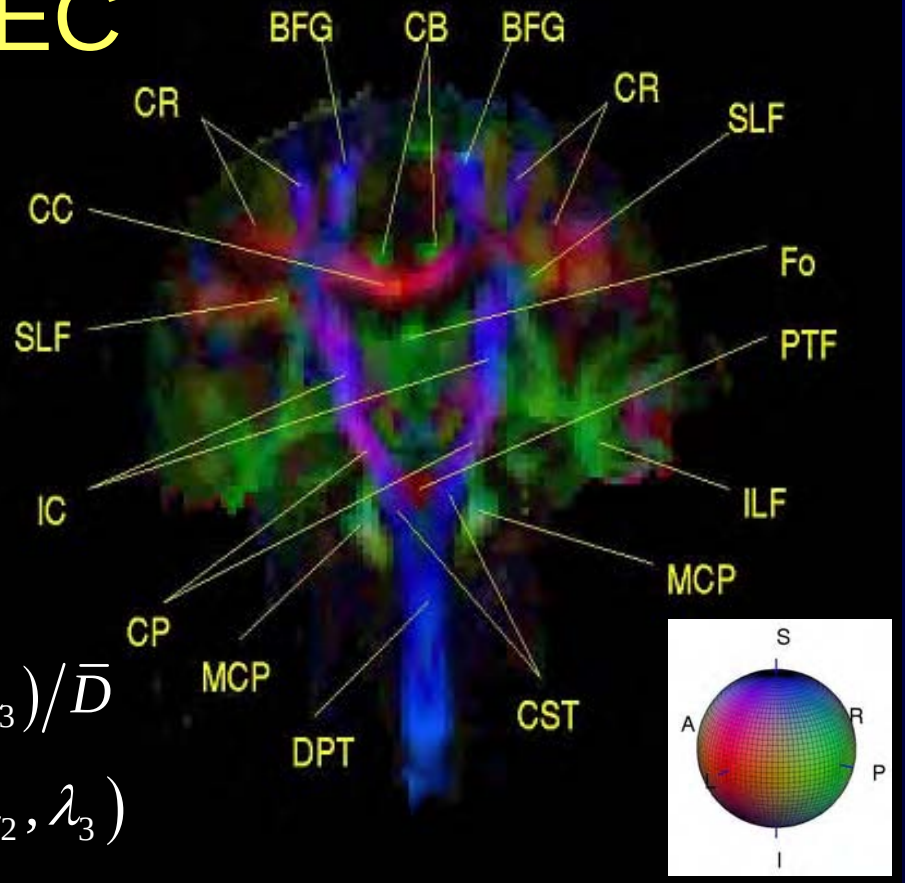


Local Structures

Fractional Anisotropy (FA) Mapping

FA

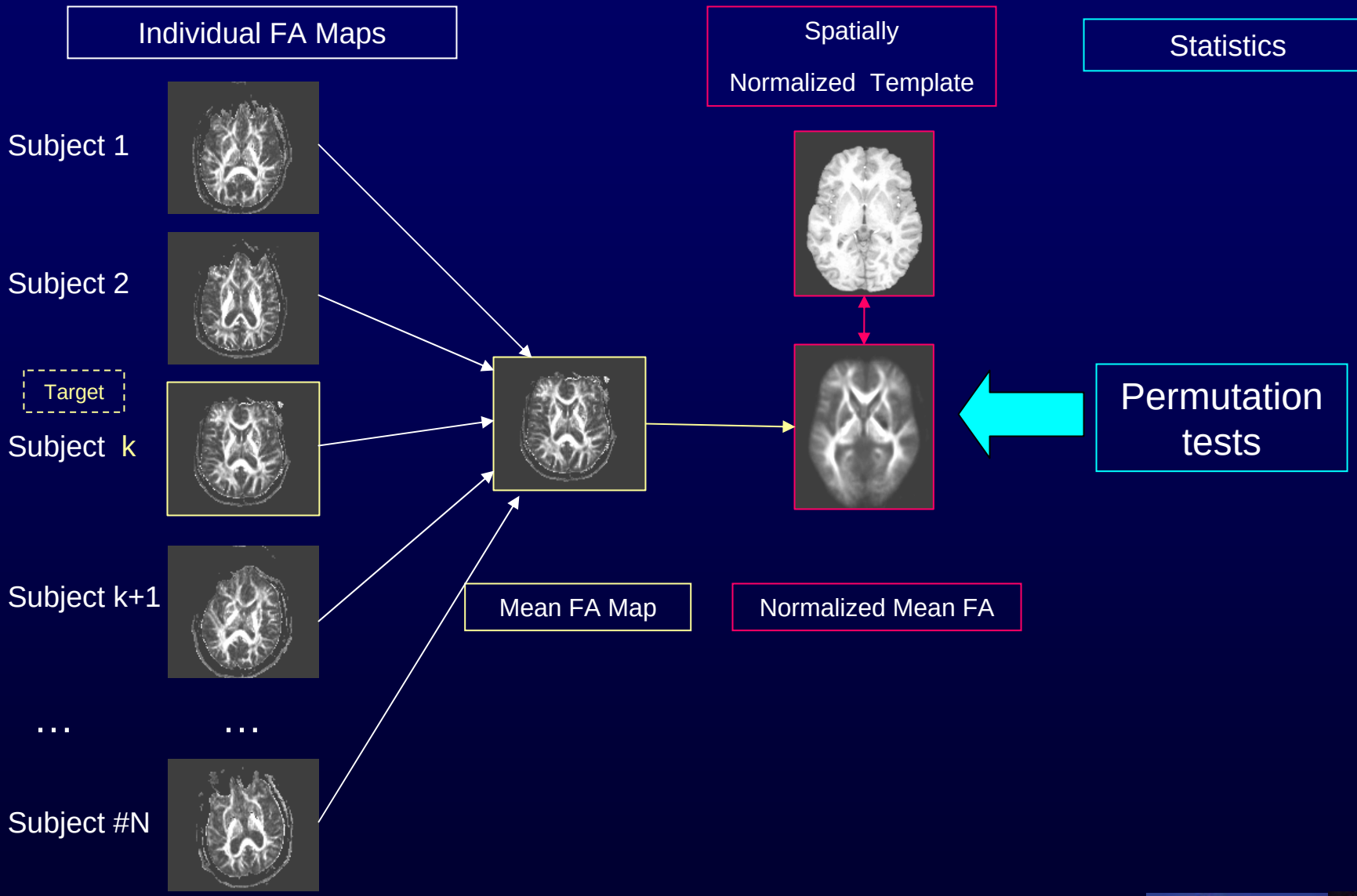
DEC



$$FA = SD(\lambda_1, \lambda_2, \lambda_3) / \bar{D}$$

$$\bar{D} = mean(\lambda_1, \lambda_2, \lambda_3)$$

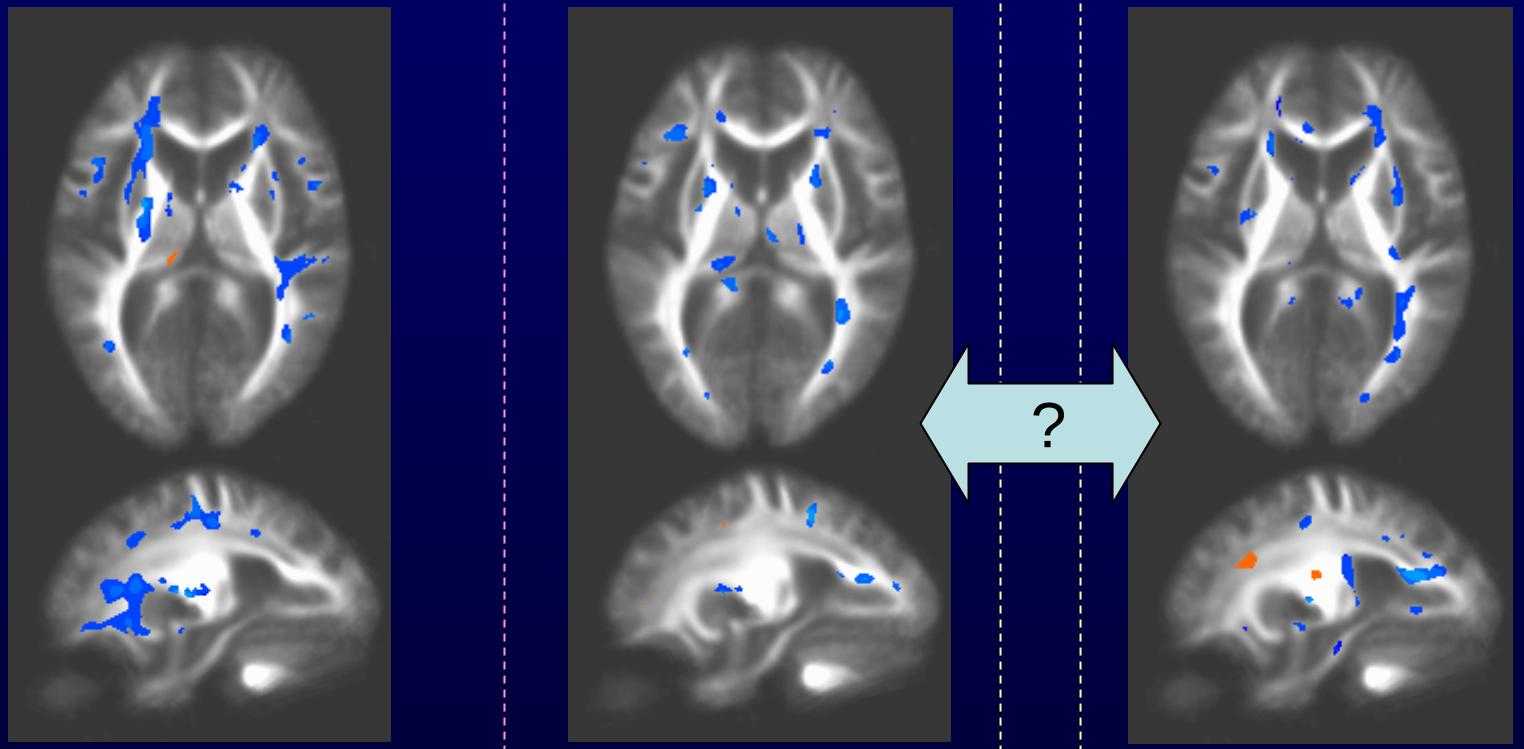
Voxelwise Group Analysis on DTI



FA Declines with Aging, ApoE-4, and AD

33 NC (F=17), ApoE-4 = 15

13 AD vs. 13 NC

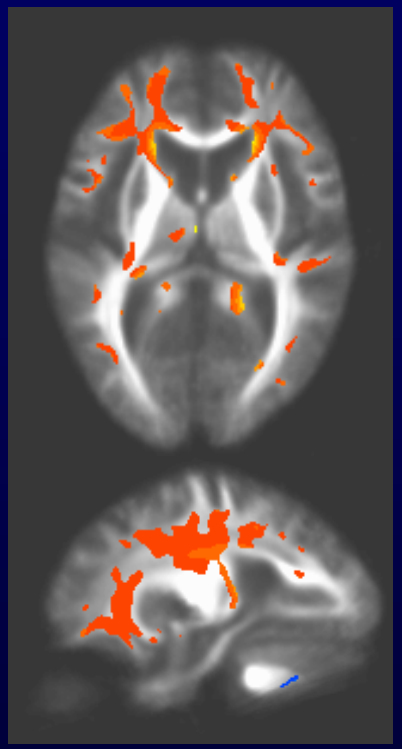


FA↓ ~ age↑
(p<0.01)

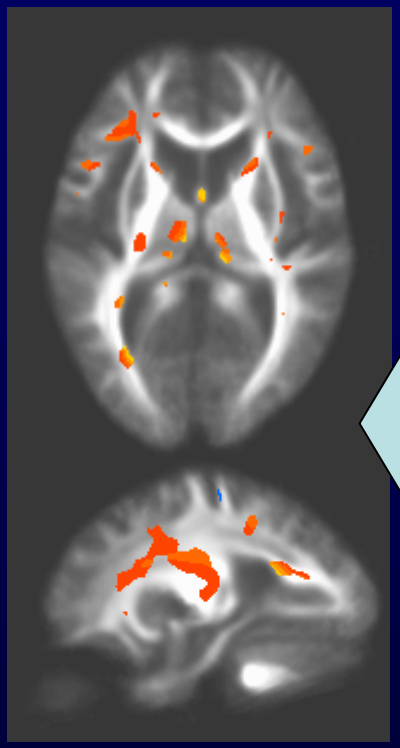
FA↓ in ApoE4
(p<0.01)

FA↓ in AD
(p<0.01)

MD Increases with Aging, ApoE4, and AD

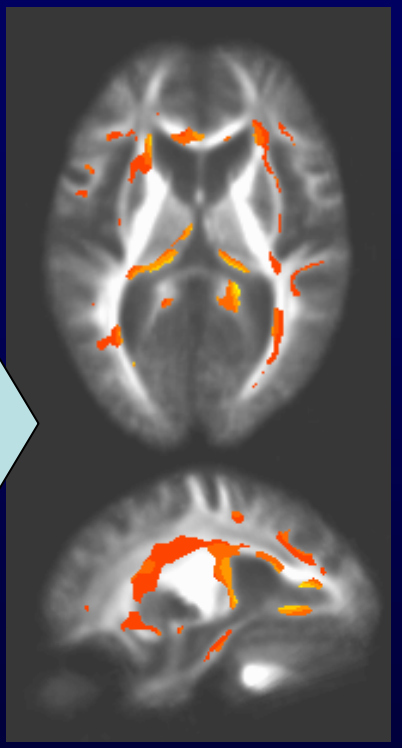


MD ↑ ~ age ↑
(p<0.01)



MD ↑ in ApoE4
(p<0.01)

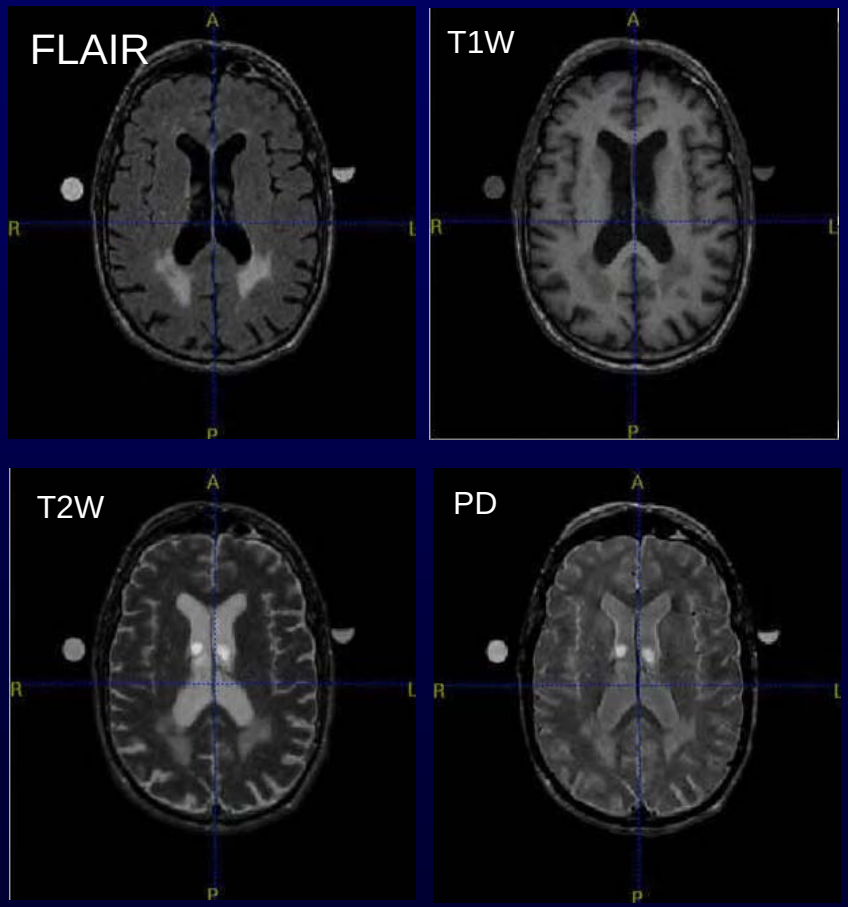
?



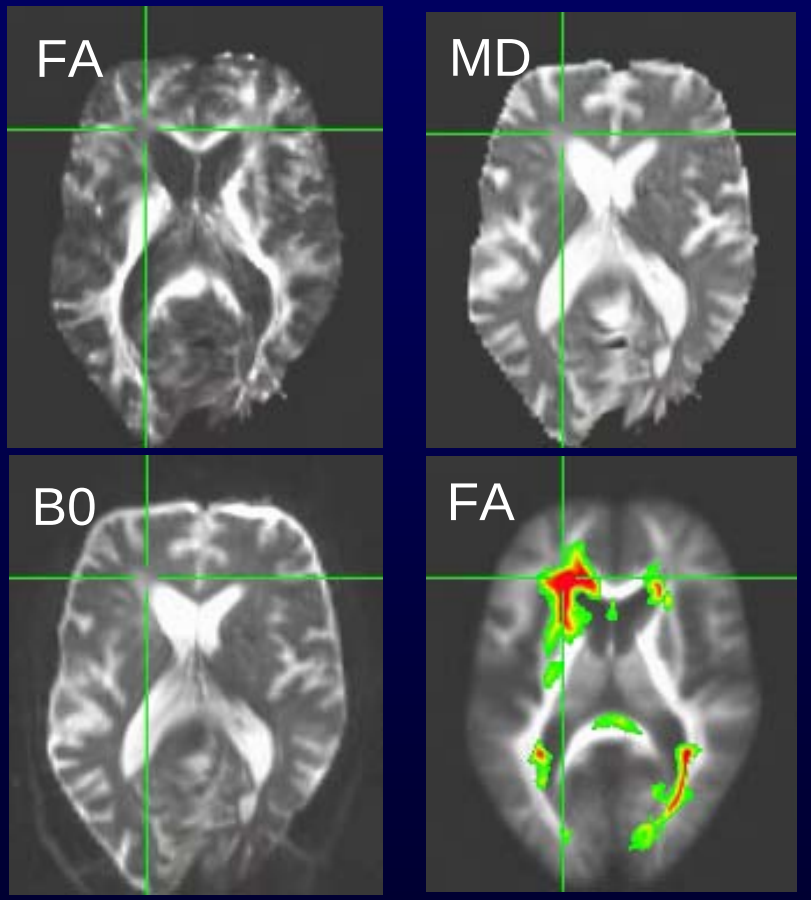
MD ↑ in AD
(p<0.01)

MRI Modalities on WM Lesions

Traditional MRI



Diffusion Tensor MRI



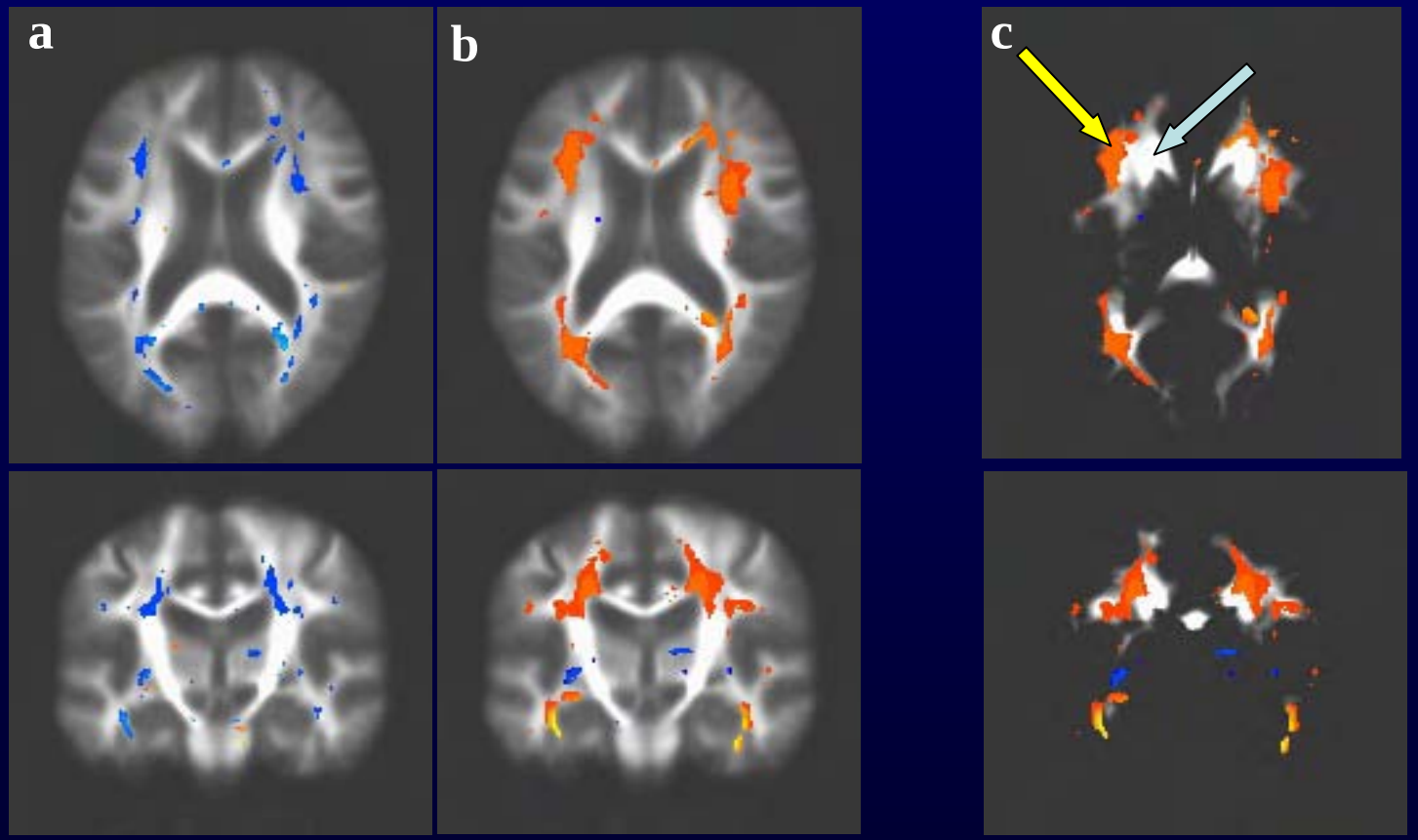
Krishnan et al., 2005, Duke Silvio Conte Center

DTI – WML Correlations *In Vivo*

FA↔WML

MD↔WML

MD↔WML



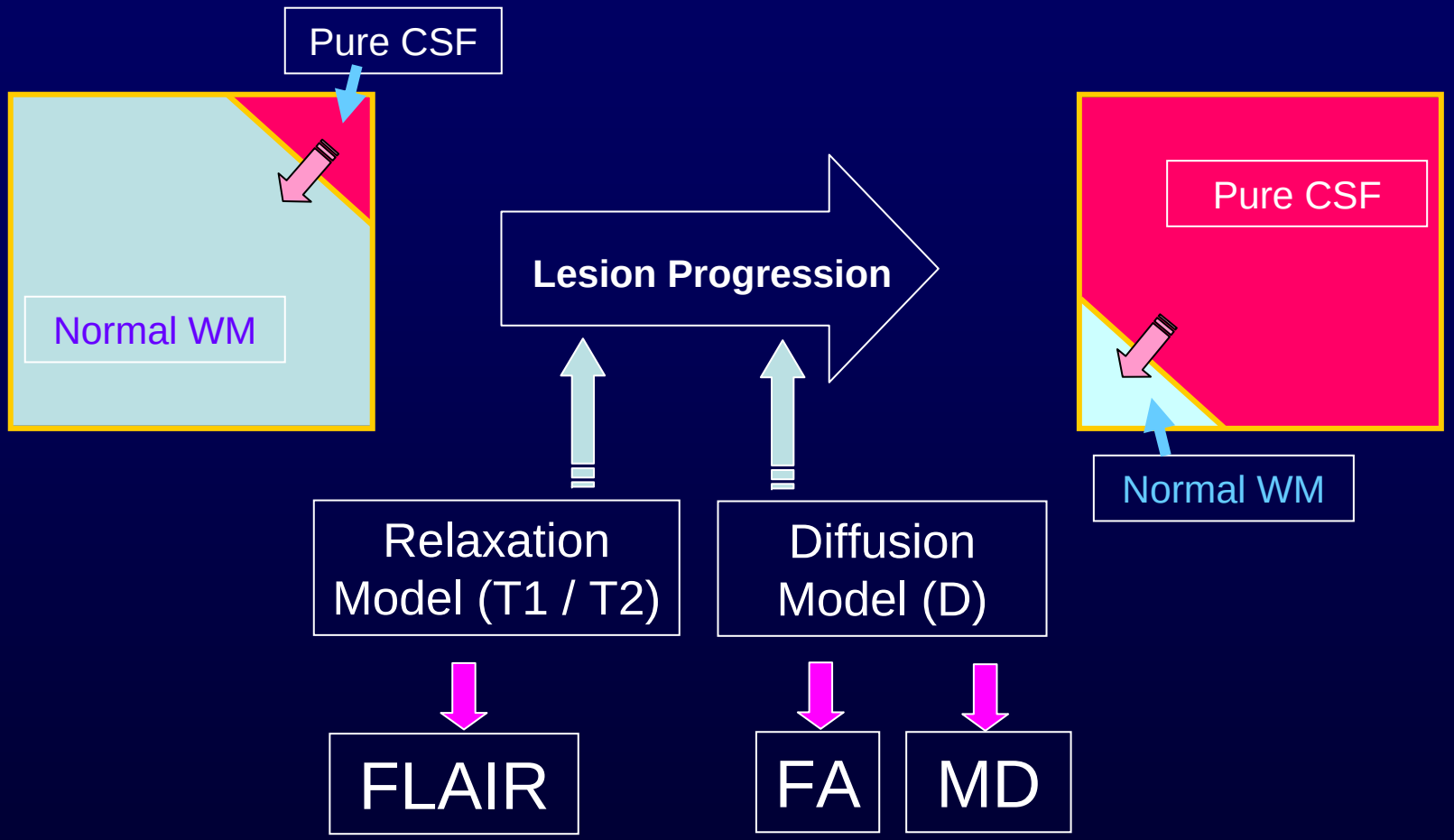
Mean FA

Mean FA

WMH

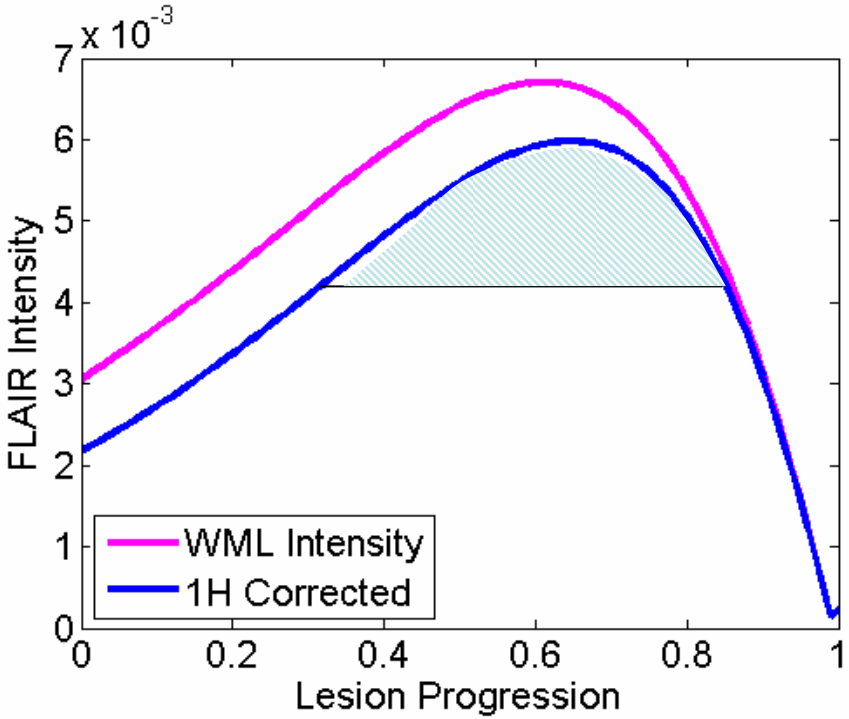
Subjects: N=47 (F=26), Age=77±6, MMSE=27.3±3.3, WML=11±16 (ml)

Modeling for WM Degeneration

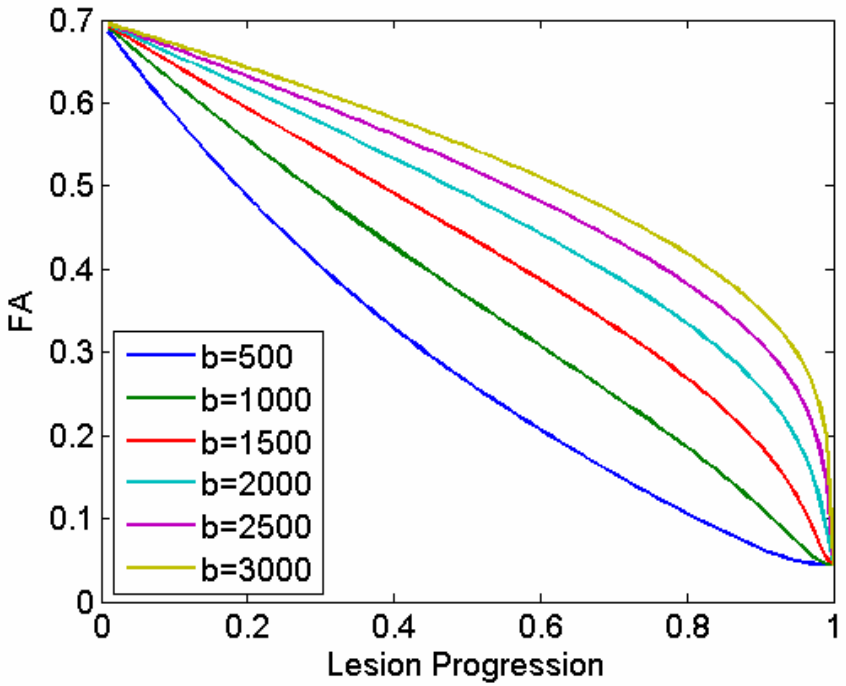


FLAIR / DTI with WM Degeneration

FLAIR



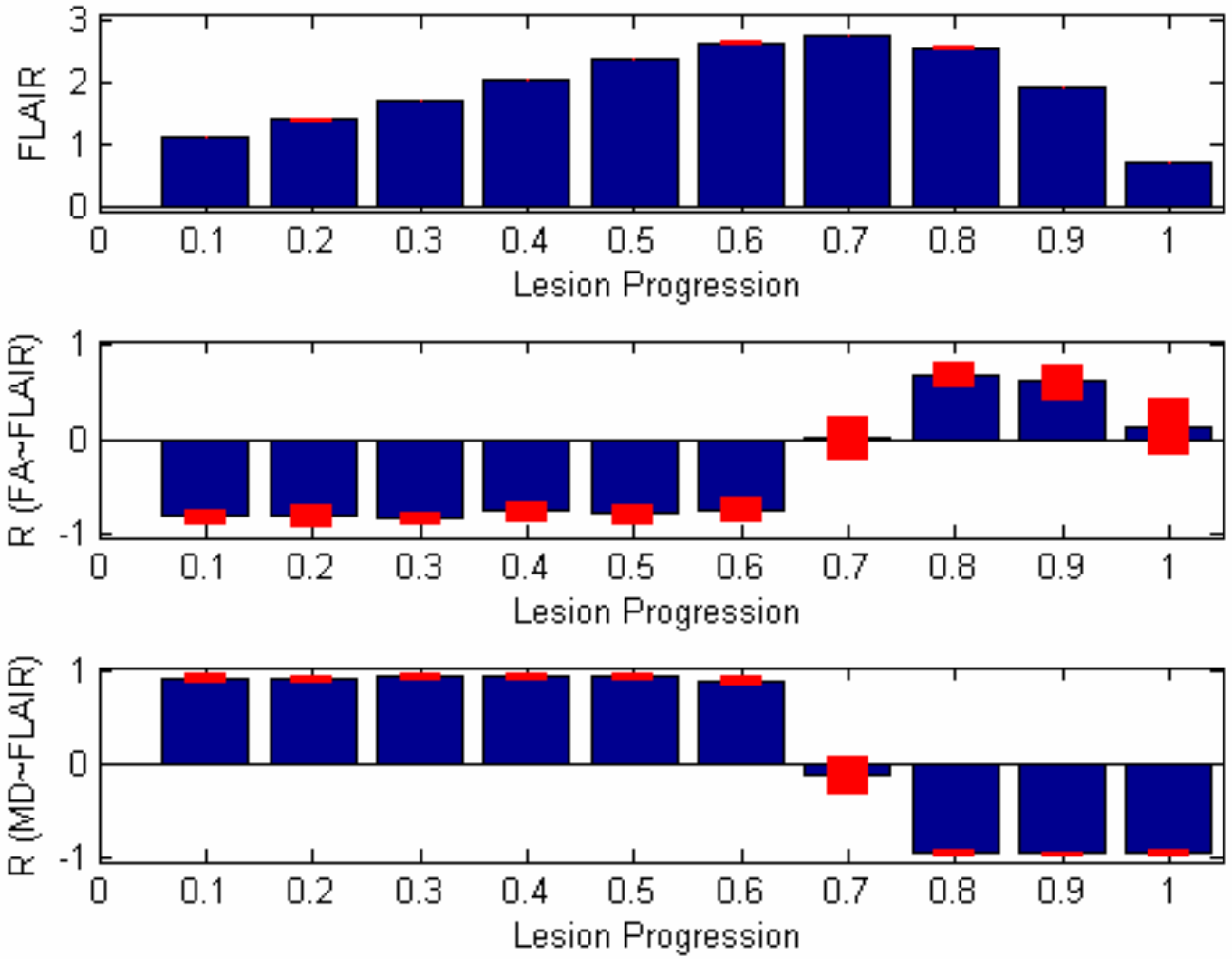
DTI



FLAIR at 4T: TR / TE = 6000 / 355 (ms), TI = 2030 (ms)

DTI at 4T: TR / TE = 6000 / 77 (ms), b = 500~3000 (s/mm^2)

Simulated Correlation Coefficients (N=20)

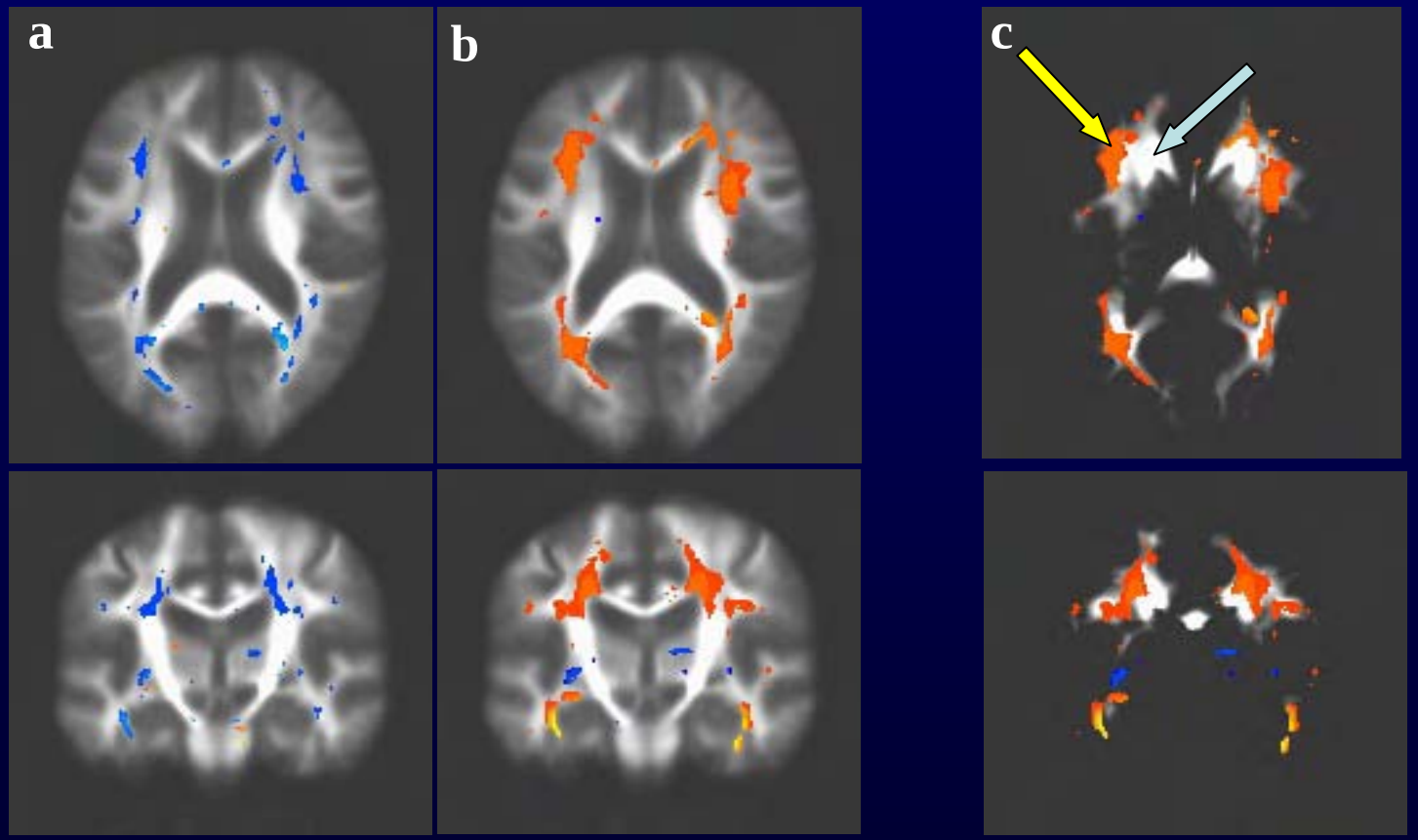


DTI – WML Correlations *In Vivo*

FA↔WML

MD↔WML

MD↔WML



Mean FA

Mean FA

WMH

Subjects: N=47 (F=26), Age=77±6, MMSE=27.3±3.3, WML=11±16 (ml)

Summary #1

- DTI provides a sensitive tool to measure the WM integrity changes at group level.
- WM alterations in normal ApoE4 carriers show a similar pattern as what is found in AD patients.
- Significant correlations between DTI and FLAIR measures occur in WM regions where WML are moderately intense on FLAIR, but do not appear in the regions where WML intensity is particularly high.

Summary #2 and Conclusion

- A two-compartment model of WML is able to explain the FLAIR and DTI signal changes during WM degeneration.

- We conclude that co-analysis of FLAIR and DTI can provide WM characterization that may not be captured by single modalities alone.

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